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COLUMBIA: THE FIRST FIVE FLIGHTS

ENTRY HEATING DATA SERIES

VOLUME 4

THE LOWER WINDWARD WING 50% AND 80% SEMI-SPANS

By S. D. Williams

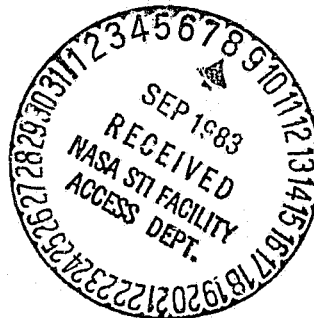
May 1983

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ERRATA

Columbia: The First Five Flights

Entry Heating Data Series

Volume 4

The Lower Windward Wing 50% and 80% Semi-Spans

May 1983

NASA-CR-171666

After publication and distribution of the document listed above it was observed that the numerical values of the Normal Shock Reynolds Numbers flagged on the h/h_{ref} vs. α plots were incorrectly labeled. Although the flagged values were correct with respect to time and α the freestream values instead of the normal shock values were printed. The analyst can obtain the correct value for wind tunnel conditions by multiplying the stated values by 0.1121 or by using the values shown in the following table. This error is consistent for Volumes 2 through 6. The author regrets any inconvenience this has caused for the serious researcher.

Correlation Between Free Stream and Normal Shock Reynolds Numbers at Wind Tunnel Conditions

0.0175 Scale $Re_{\infty} / ft \times 10^6$	107 Ft. Length $Re_{\infty} \times 10^6$	107 Ft. Length $Re_{NS} \times 10^5$
0.50	0.936	1.050
1.00	1.873	2.099
1.50	2.809	3.149
2.00	3.745	4.198
2.50	4.681	5.248
3.00	5.618	6.297
3.50	6.554	7.347
3.70	6.928	7.767

DISCUSSION:

Over 2,000 design flight instruments (DFI) were installed on Columbia with the majority of the DFI flight data recorded during ascent and entry (Ref. 1). Additional real-time instrumentation was used to continuously monitor the thermal subsystems during each flight. Successful completion of the first five flights of the Space Shuttle Orbiter has provided sufficient data from radiometers, thermocouples, and pressure transducers to appraise the aerothermodynamic/TPS performance.

The entry heating presented in this report is restricted to the Lower Wingward Wing 50% and 80% Semi-Spans, see Fig. 1. A tabulation of the orbiter X, Y, Z coordinates for each instrument can be found in Table I. This data is presented in two Appendices:

Appendix A: Correlation Parameters

Appendix B: Flight Data

As an aid to the reader, the page numbers for the specific correlation parameters and flight data for each Appendix can be found in Tables II and III.

The surface heating and temperature data presented in this volume is based on the thermal analysis at each individual location via the JSC NONLIN/INVERSE computer program, Ref. 2. Values of angle-of-attack and the derived free stream Mach number were obtained from the JSC/MPAD Best Estimated Trajectory (BET) data tapes for each flight. The corresponding data values for Normal Shock Reynolds number (Ref. 3), reference heating rate, reference film coefficient, and total enthalpy were obtained via the MINIVER computer program (Ref. 4). Values of h/h_{ref} were computed using $0.9H_T$ recovery enthalpy. The comparison of wind tunnel data ($0.9H_T$) with flight data was obtained by linear interpolation for all locations except for the 50% semi-span $X/C=0.40$ location. At wind tunnel conditions, $Mach \sim 8$, (Ref. 5) the Normal Shock Reynolds number is .1121 times the Reynolds number based on freestream parameters.

All heating rates were calculated with a view factor of 1. The surface emissivity of all instruments was assumed to be 0.85. All heating rates compared to flight parameters (α , M_∞ , and Re_{NS}) are presented on a log scale with imposed limits of $10^{-3} \leq h/h_{ref} \leq 1$. No wind tunnel data is presented for those instruments on the elevons since the elevon deflection varied during entry. As an aid for interpreting this data flag events are superimposed on the plots. For the α vs. h/h_{ref} plots the values of Re_{NS} corresponding to wind tunnel data values are denoted. For the M_∞ vs. h/h_{ref} and Re_{NS} vs. h/h_{ref} plots values of α (latest in time occurrence) are denoted.

The DFI data is available throughout the entire trajectory for STS-2, STS-3, and STS-5. Due to DFI data recorder errors or malfunctions only limited entry data is available for STS-1 and STS-4.

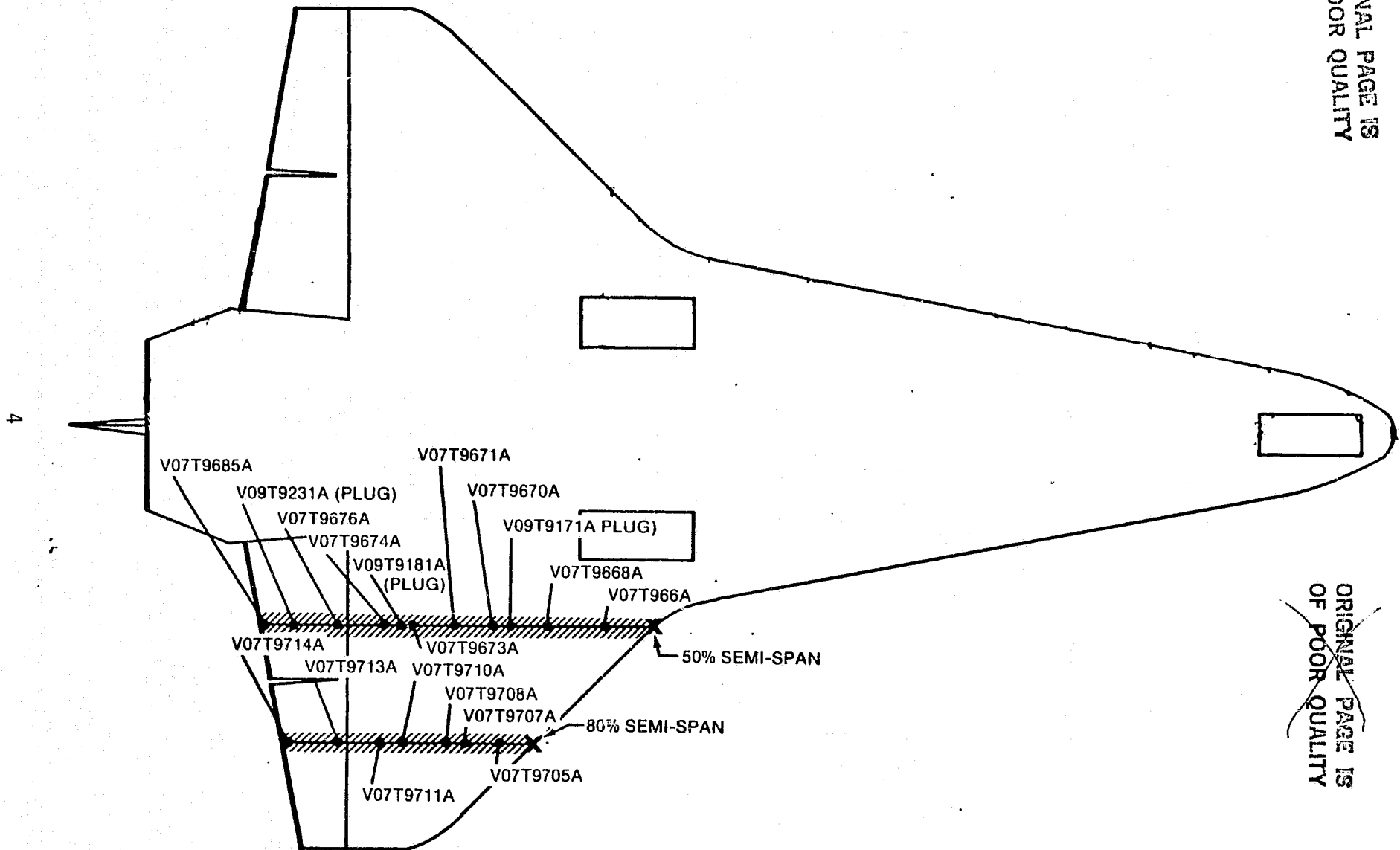
Entry heating data for other vehicle areas is presented in additional volumes. Volume 1: An Overview, see Ref. 6, contains the underlying assumptions, detailed trajectory information, and pertinent information for the integration of all subsequent volumes. In order to provide an adequate overview of the entry heating volume 1 will be the last released publication in this series of reports.

REFERENCES:

1. Smith, J. A., STS-3 Structural & Aerodynamic Pressure and Aerothermodynamics & Thermal Protection System Measurement Locations, NASA JSC 17889, January 15, 1982.
2. Williams, S. D. and Curry, D. M., An Analytical and Experimental Study Using a Single Embedded Thermocouple, J. Spacecraft and Rockets, Vol. 14, October 1977, pp. 632-637.
3. Ried, R. C., Jr.; Goodrich, W. D.; Strouhal, G.; and Curry, D. M.: The Importance of Boundary Layer Transition to the Space Shuttle Design, Proceedings of the Boundary Layer Transition Workshop held Nov. 3-5, 1971. Aerospace Report No. TOR-0172 (S2816-16) -5, Dec. 20, 1971.
4. Hender, D. R., A Miniature Version of the JA70 Aerodynamic Heating Computer Program, H800 (MINIVER) MDC G0462, McDonnell Douglas Astronautics Company Huntington Beach, CA, June 1970, Revised January 1972.
5. Martindale, W. R., Kaul, C. E., and Nutt, K. W., Test Results from the NASA/Rockwell International Space Shuttle Orbiter Heating Test (OH39B) conducted in the AEDC-VKF Tunnel B, AEDC-DR-75-17 VonKarman Gas Dynamics Facility, ARO, Inc., Arnold Engineering Development Center, Arnold Air Force Station, Tennessee, Feb. 28, 1975.
6. Williams, S. D. Columbia: The First Five Flights Entry Heating Data Series, Volume 1, An Overview

WINDWARD LOWER SURFACE

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Figure 1 - Measurement Location on Wing Lower Surface

TABLE I

LOWER WING 50% AND 80% SEMI-SPAN COORDINATES

50% SEMI-SPAN $Y_0 = -234.170$

<u>MID</u>	<u>X/C</u>	<u>X₀</u>	<u>Y₀</u>
V07T9666A	0.13	1121.7	-235.5
9668A	0.28	1183.2	-233.4
V09T9171A+	0.36	1219.1	-239.5
V07T9670A	0.40	1235.4	-233.3
9671A	0.50	1275.7	-235.5
9673A	0.61	1320.2	-233.3
V09T9181A+	0.64	1335.9	-239.9
V07T9674A	0.68	1353.1	-236.4
9676A	0.79	1397.7	-234.0
V09T9231A+	0.90	1443.5	-231.4
V07T9685A	0.99	1477.7	-240.2
Eleven Hinge	0.76	1386	

80% SEMI-SPAN $Y_0 = -374.672$

<u>MID</u>	<u>X/C</u>	<u>X₀</u>	<u>Y₀</u>
V07T9705A	0.15	1248.0	-368.5
9707A	0.28	1280.4	-367.9
9708A	0.35	1297.1	-370.8
9710A	0.52	1340.3	-368.3
9711A	0.61	1362.0	-369.3
9713A	0.77	1402.0	-373.6
9714A	0.98	1454.3	-372.3
Eleven Hinge	0.71	1386	

+ Plug instrumented

TABLE II

PAGE NUMBERS FOR APPENDIX A:

CORRELATION PARAMETERS

			STS - Flight				
Flight Parameter			STS-1	STS-2	STS-3	STS-4	STS-5
α	VS	t	1	2	3	4	5
M_∞	VS	t	6	7	8	9	10
Re_{NS}	VS	t	11	12	13	14	15
α	VS	M_∞	16	17	18	19	20
α	VS	Re_{NS}	21	22	23	24	25
M_∞	VS	Re_{NS}	26	27	28	29	30
\dot{q}_{ref}	VS	t	31	32	33	34	35
\dot{q}_{ref}	VS	α	36	37	38	39	40
\dot{q}_{ref}	VS	M_∞	41	42	43	44	45
\dot{q}_{ref}	VS	Re_{NS}	46	47	48	49	50
h_{ref}	VS	t	51	52	53	54	55
h_{ref}	VS	α	56	57	58	59	60
h_{ref}	VS	M_∞	61	62	63	64	65
h_{ref}	VS	Re_{NS}	66	67	68	69	70

Table III - Page Numbers for Appendix B: Flight Data

STS - Flight

Measurement				STS-1	STS-2	STS-3	STS-4	STS-5
V07T9666A	- h/h_{ref}	vs	α	1	2	3	4	5
	- h/h_{ref}	vs	M_{∞}	6	7	8	9	10
	- h/h_{ref}	vs	Re_{NS}	11	12	13	14	15
	- \dot{q}_{conv}	vs	t	16	17	18	19	20
	- T_s	vs	t	21	22	23	24	25
V07T9668A	- h/h_{ref}	vs	α	26	27	28	29	30
	- h/h_{ref}	vs	M_{∞}	31	32	33	34	35
	- h/h_{ref}	vs	Re_{NS}	36	37	38	39	40
	- \dot{q}_{conv}	vs	t	41	42	43	44	45
	- T_s	vs	t	46	47	48	49	50
V09T9171A	- h/h_{ref}	vs	α	51	52	53	54	55
	- h/h_{ref}	vs	M_{∞}	56	57	58	59	60
	- h/h_{ref}	vs	Re_{NS}	61	62	63	64	65
	- \dot{q}_{conv}	vs	t	66	67	68	69	70
	- T_s	vs	t	71	72	73	74	75
V07T9670A	- h/h_{ref}	vs	α	76	77	78	79	80
	- h/h_{ref}	vs	M_{∞}	81	82	83	84	85
	- h/h_{ref}	vs	Re_{NS}	86	87	88	89	90
	- \dot{q}_{conv}	vs	t	91	92	93	94	95
	- T_s	vs	t	96	97	98	99	100
V07T9671A	- h/h_{ref}	vs	α	101	102	103	104	105
	- h/h_{ref}	vs	M_{∞}	106	107	108	109	110
	- h/h_{ref}	vs	Re_{NS}	111	112	113	114	115
	- \dot{q}_{conv}	vs	t	116	117	118	119	120
	- T_s	vs	t	121	122	123	124	125
V07T9673A	- h/h_{ref}	vs	α	126	127	128	129	130
	- h/h_{ref}	vs	M_{∞}	131	132	133	134	135
	- h/h_{ref}	vs	Re_{NS}	136	137	138	139	140
	- \dot{q}_{conv}	vs	t	141	142	143	144	145
	- T_s	vs	t	146	147	148	149	150

Table III - Continued

STS - Flight

Measurement				STS-1	STS-2	STS-3	STS-4	STS-5
V09T9181A	- h/h_{ref}	vs	α	151	152	153	154	155
	- h/h_{ref}	vs	M_{∞}	156	157	158	159	160
	- h/h_{ref}	vs	Re_{NS}	161	162	163	164	165
	- \dot{q}_{conv}	vs	t	166	167	168	169	170
	- T_s	vs	t	171	172	173	174	175
V07T9674A	- h/h_{ref}	vs	α	176	177	178	179	180
	- h/h_{ref}	vs	M_{∞}	181	182	183	184	185
	- h/h_{ref}	vs	Re_{NS}	186	187	188	189	190
	- \dot{q}_{conv}	vs	t	191	192	193	194	195
	- T_s	vs	t	196	197	198	199	200
V07T9676A	- h/h_{ref}	vs	α	201	202	203	204	205*
	- h/h_{ref}	vs	M_{∞}	206	207	208	209	210*
	- h/h_{ref}	vs	Re_{NS}	211	212	213	214	215*
	- \dot{q}_{conv}	vs	t	216	217	218	219	220*
	- T_s	vs	t	221	222	223	224	225*
V09T9231A	- h/h_{ref}	vs	α	226	227	228	229	230
	- h/h_{ref}	vs	M_{∞}	231	232	233	234	235
	- h/h_{ref}	vs	Re_{NS}	236	237	238	239	240
	- \dot{q}_{conv}	vs	t	241	242	243	244	245
	- T_s	vs	t	246	247	248	249	250
V07T9685A	- h/h_{ref}	vs	α	251	252	253	254	255
	- h/h_{ref}	vs	M_{∞}	256	257	258	259	260
	- h/h_{ref}	vs	Re_{NS}	261	262	263	264	265
	- \dot{q}_{conv}	vs	t	266	267	268	269	270
	- T_s	vs	t	271	272	273	274	275
V07T9705A	- h/h_{ref}	vs	α	276	277	n/a	278	279
	- h/h_{ref}	vs	M_{∞}	280	281	n/a	282	283
	- h/h_{ref}	vs	Re_{NS}	284	285	n/a	286	287
	- \dot{q}_{conv}	vs	t	288	289	n/a	290	291
	- T_s	vs	t	292	293	n/a	294	295

*Flight Data may be in error.

Table III - Continued

				STS - Flight				
Measurement				STS-1	STS-2	STS-3	STS-4	STS-5
V07T9707A	- h/h_{ref}	vs	α	296	297	n/a	298	299
	- h/h_{ref}	vs	M_{∞}	300	301	n/a	302	303
	- h/h_{ref}	vs	Re	304	305	n/a	306	307
	- \dot{q}_{conv}	vs	t	308	309	n/a	310	311
	- T_s	vs	t	312	313	n/a	314	315
V07T9708A	- h/h_{ref}	vs	α	316	317	n/a	318	319
	- h/h_{ref}	vs	M_{∞}	320	321	n/a	322	323
	- h/h_{ref}	vs	Re	324	325	n/a	326	327
	- \dot{q}_{conv}	vs	t	328	329	n/a	330	331
	- T_s	vs	t	332	333	n/a	334	335
V07T9710A	- h/h_{ref}	vs	α	336	337	338	339	340
	- h/h_{ref}	vs	M_{∞}	341	342	343	344	345
	- h/h_{ref}	vs	Re	346	347	348	349	350
	- \dot{q}_{conv}	vs	t	351	352	353	354	355
	- T_s	vs	t	356	357	358	359	360
V07T9711A	- h/h_{ref}	vs	α	361	362	363	364	365
	- h/h_{ref}	vs	M_{∞}	366	367	368	369	370
	- h/h_{ref}	vs	Re	371	372	373	374	375
	- \dot{q}_{conv}	vs	t	376	377	378	379	380
	- T_s	vs	t	381	382	383	384	385
V07T9713A	- h/h_{ref}	vs	α	386	387	388	389	390
	- h/h_{ref}	vs	M_{∞}	391	392	393	394	395
	- h/h_{ref}	vs	Re	396	397	398	399	400
	- \dot{q}_{conv}	vs	t	401	402	403	404	405
	- T_s	vs	t	406	407	408	409	410
V07T9714A	- h/h_{ref}	vs	α	411	412	413	414	415
	- h/h_{ref}	vs	M_{∞}	416	417	418	419	420
	- h/h_{ref}	vs	Re	421	422	423	424	425
	- \dot{q}_{conv}	vs	t	426	427	428	429	430
	- T_s	vs	t	431	432	433	434	435

APPENDIX A
CORRELATION PARAMETERS

STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

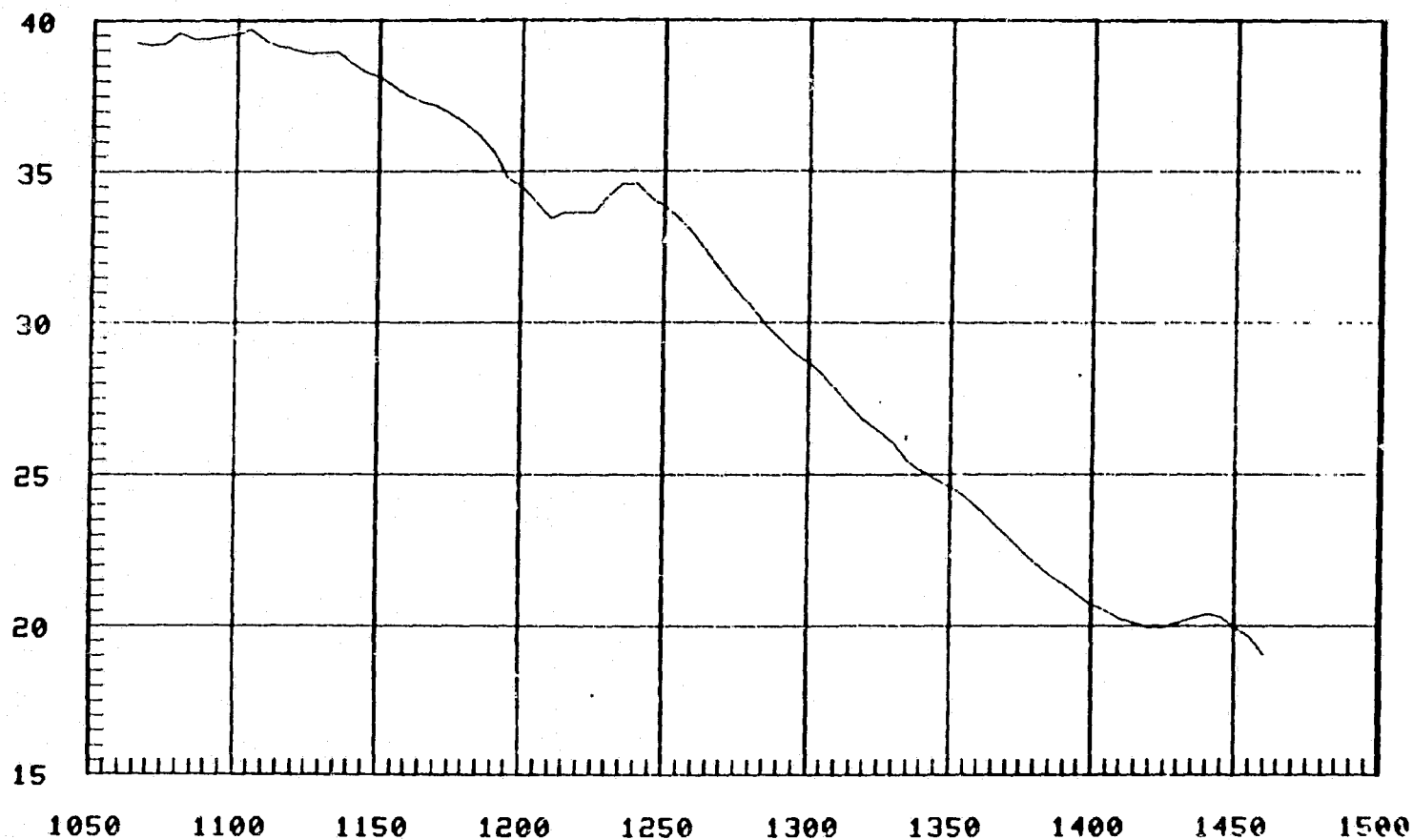
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A-1

ANGLE-OF-ATTACK - DEG



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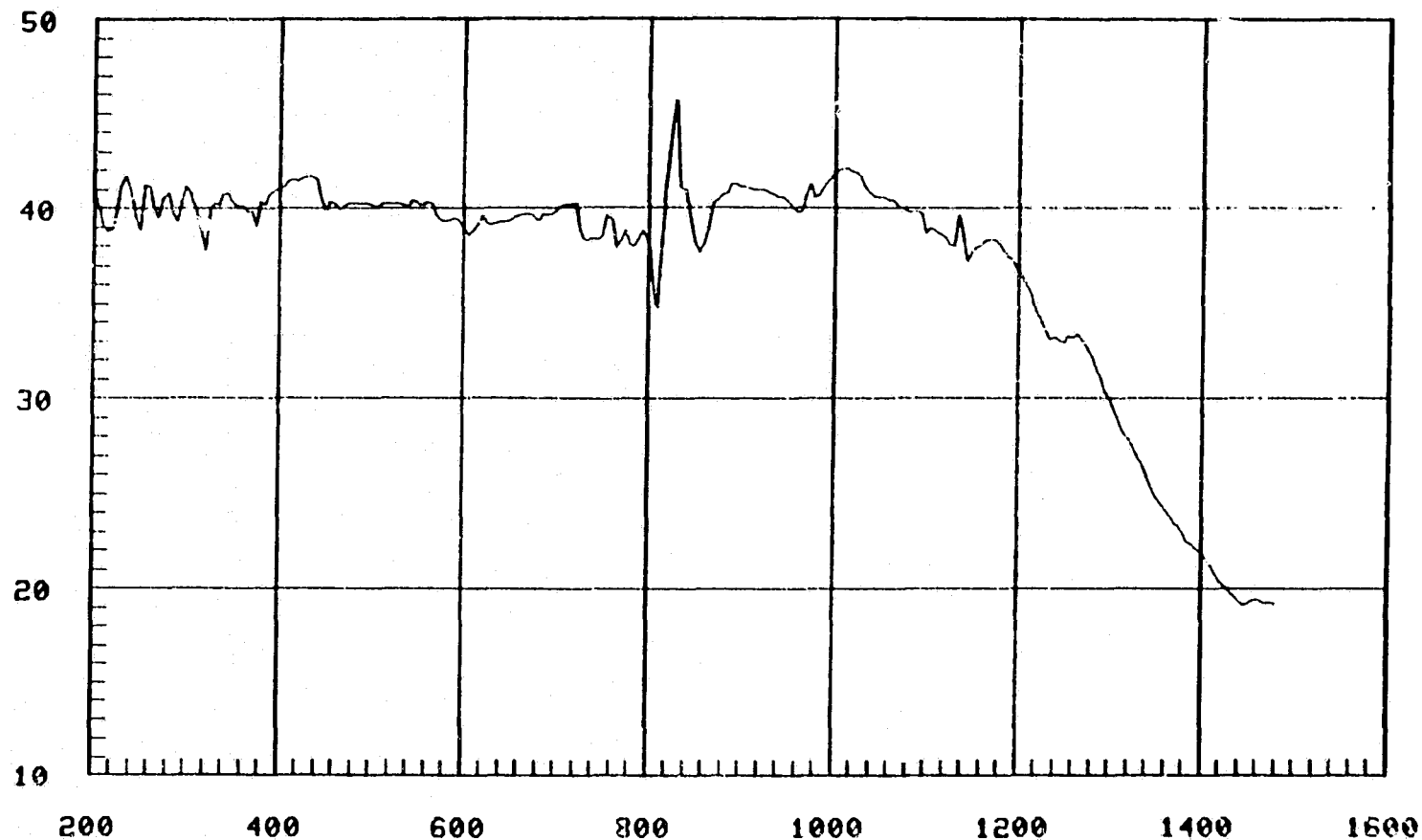
STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-2

200-1480 SEC

REGULATORY - A-2

A-2



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TIME - SECONDS

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STS-3 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

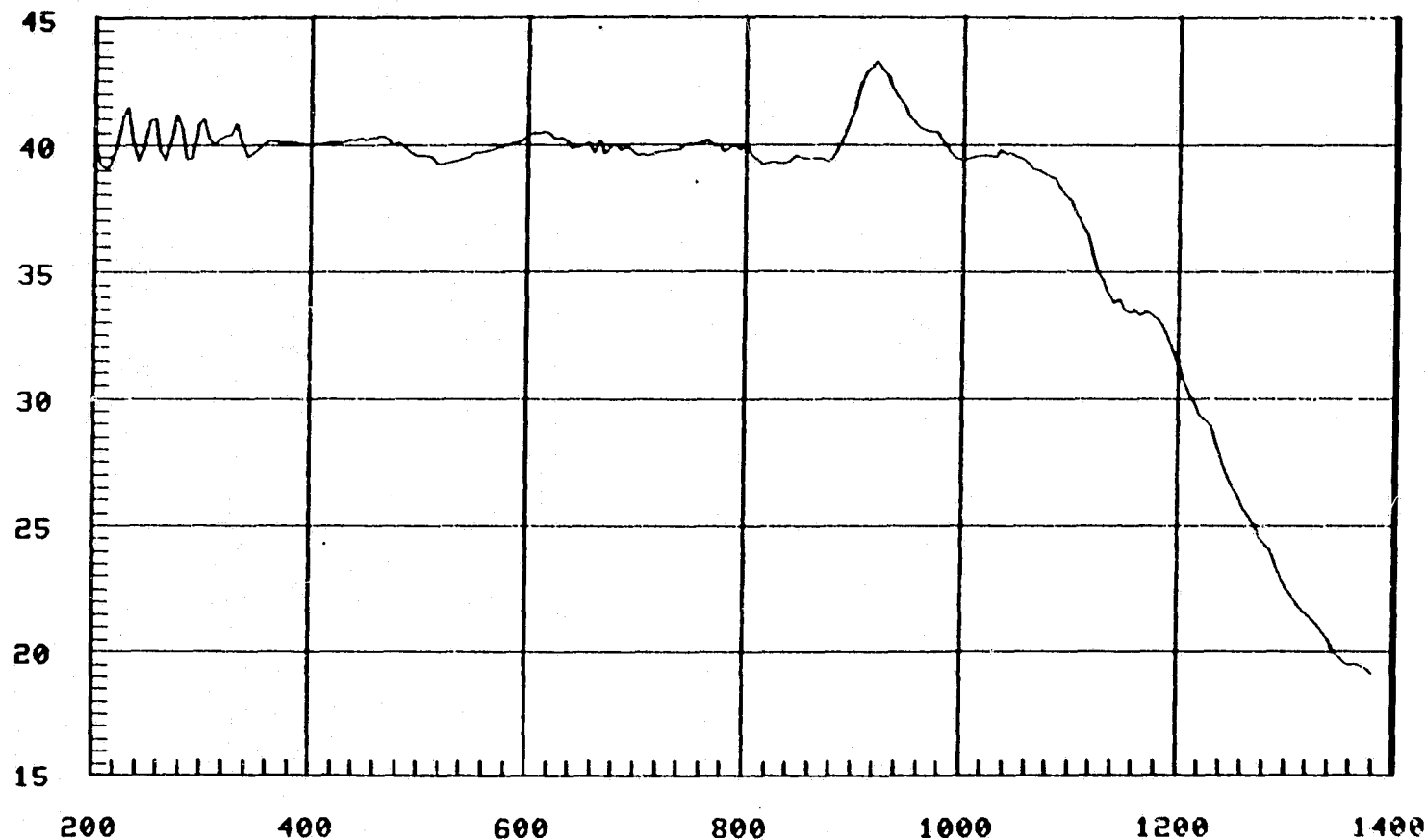
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A-3



TIME - SECONDS

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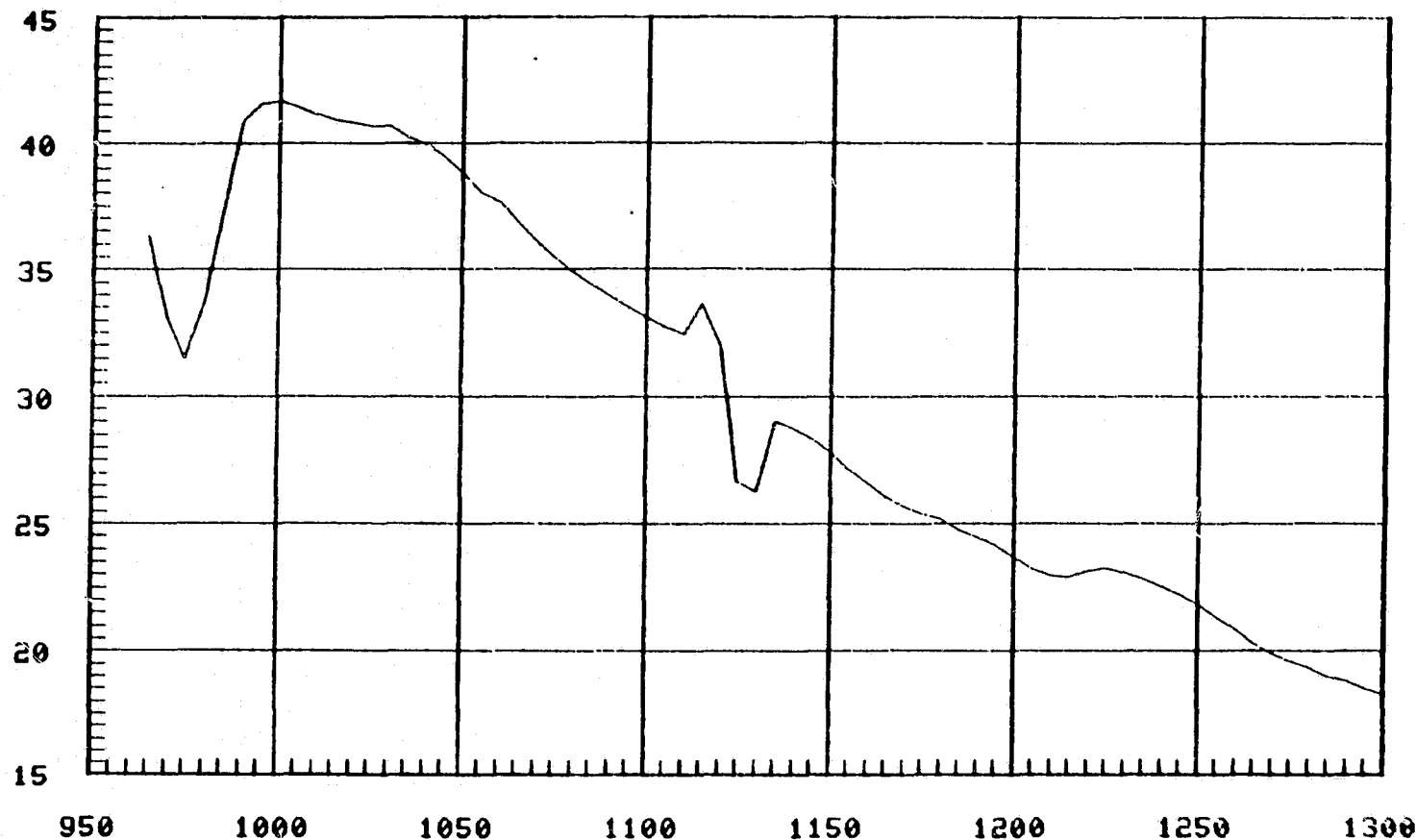
STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

— STS-4

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ANGLE-OF-ATTACK - DEG

A-4



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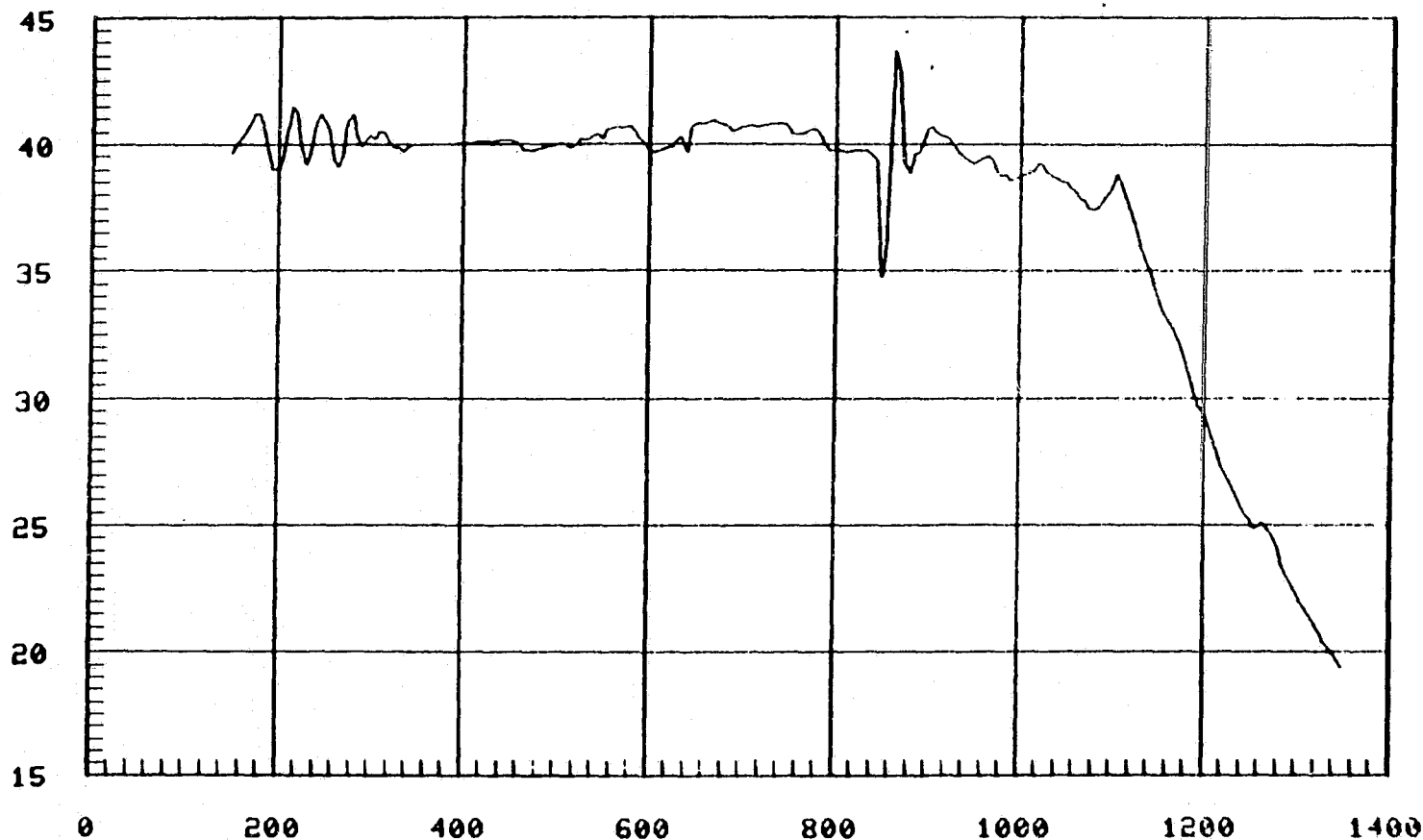
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STS-5 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

— STS-5

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ANGLE-OF-ATTACK - DEG



TIME - SECONDS

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STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

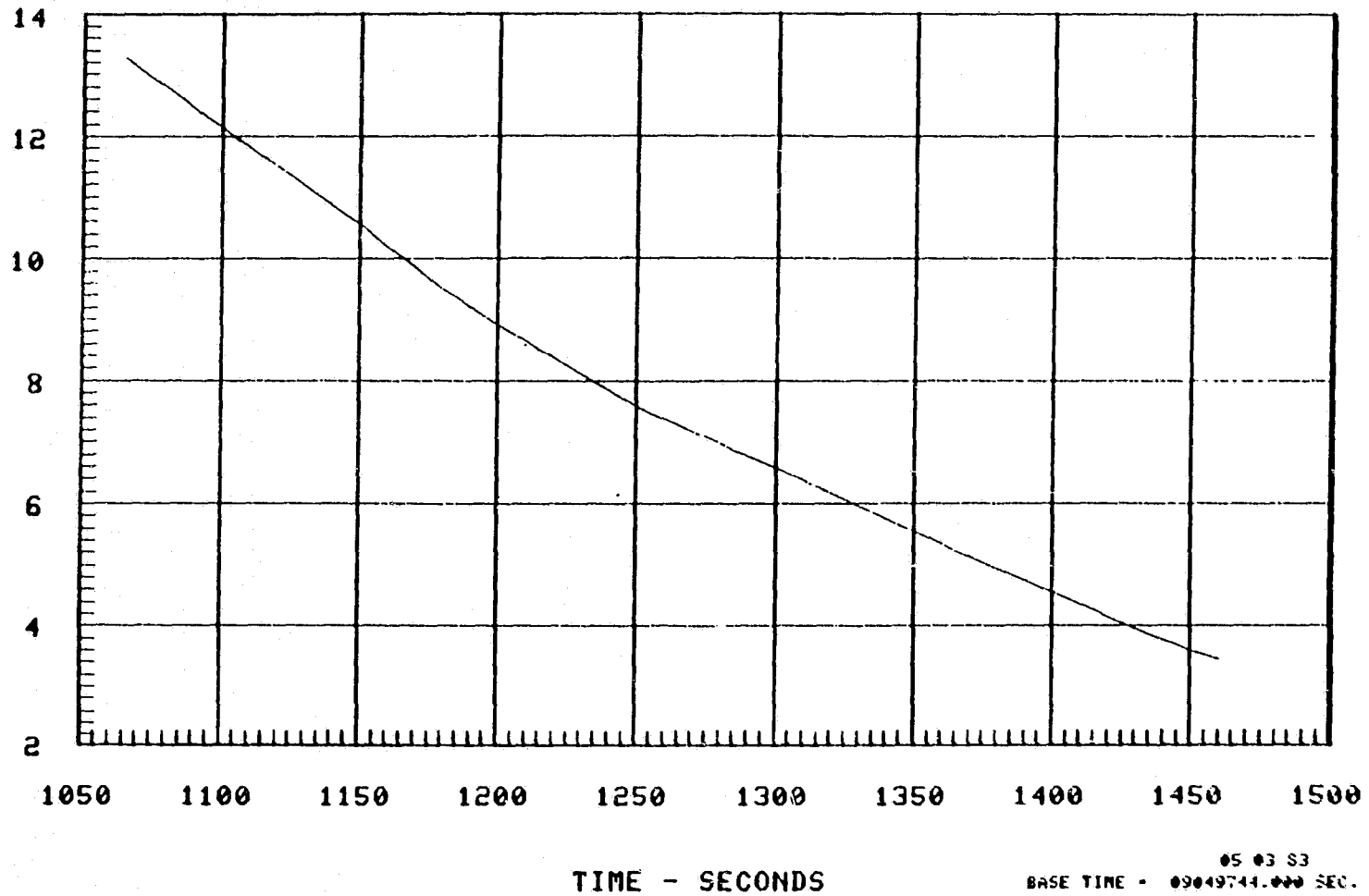
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MACH NUMBER

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STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

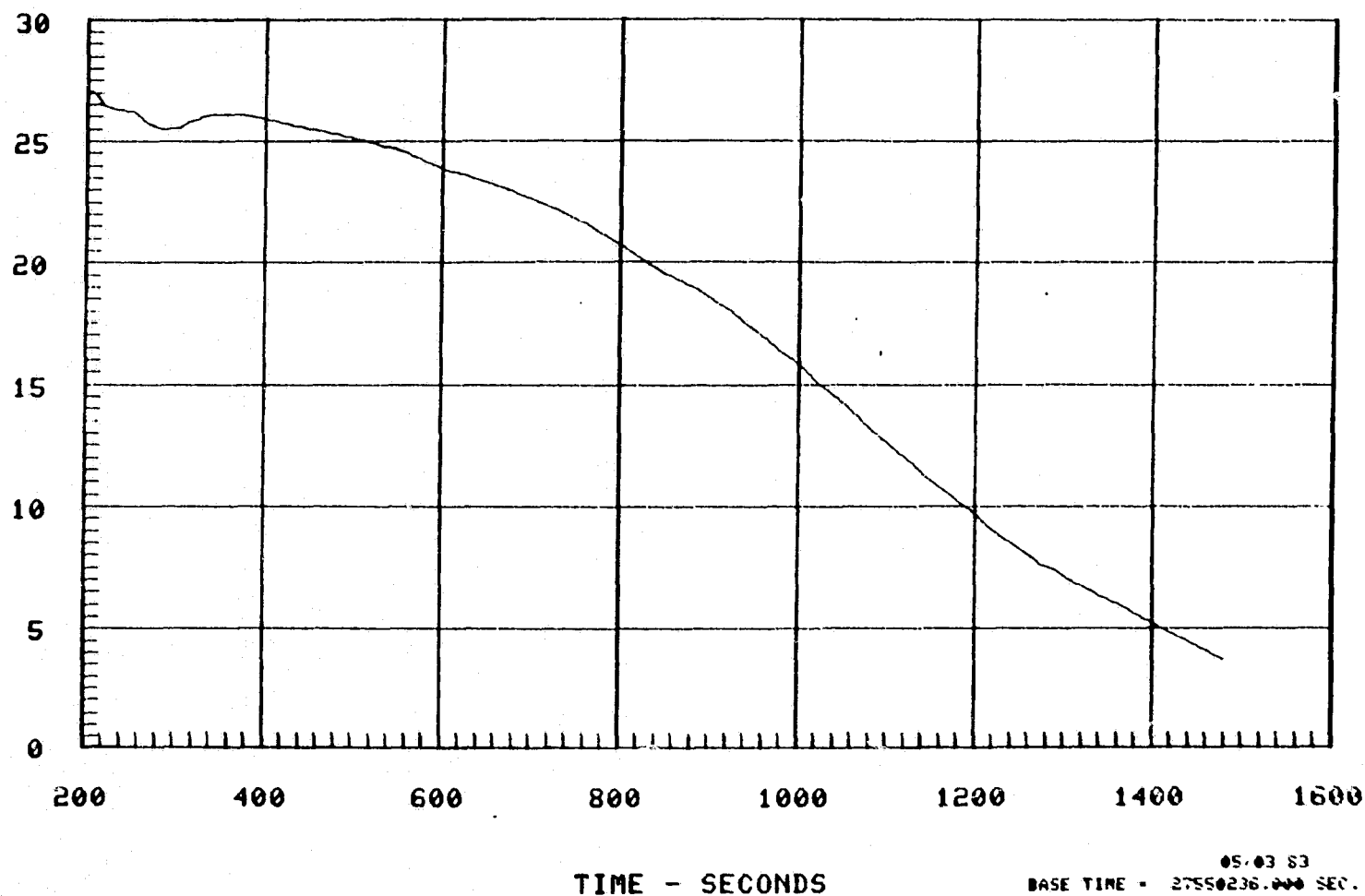
STS-2

200-1480 SEC

EGOT ZDEBMR

A-7

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STS-3 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

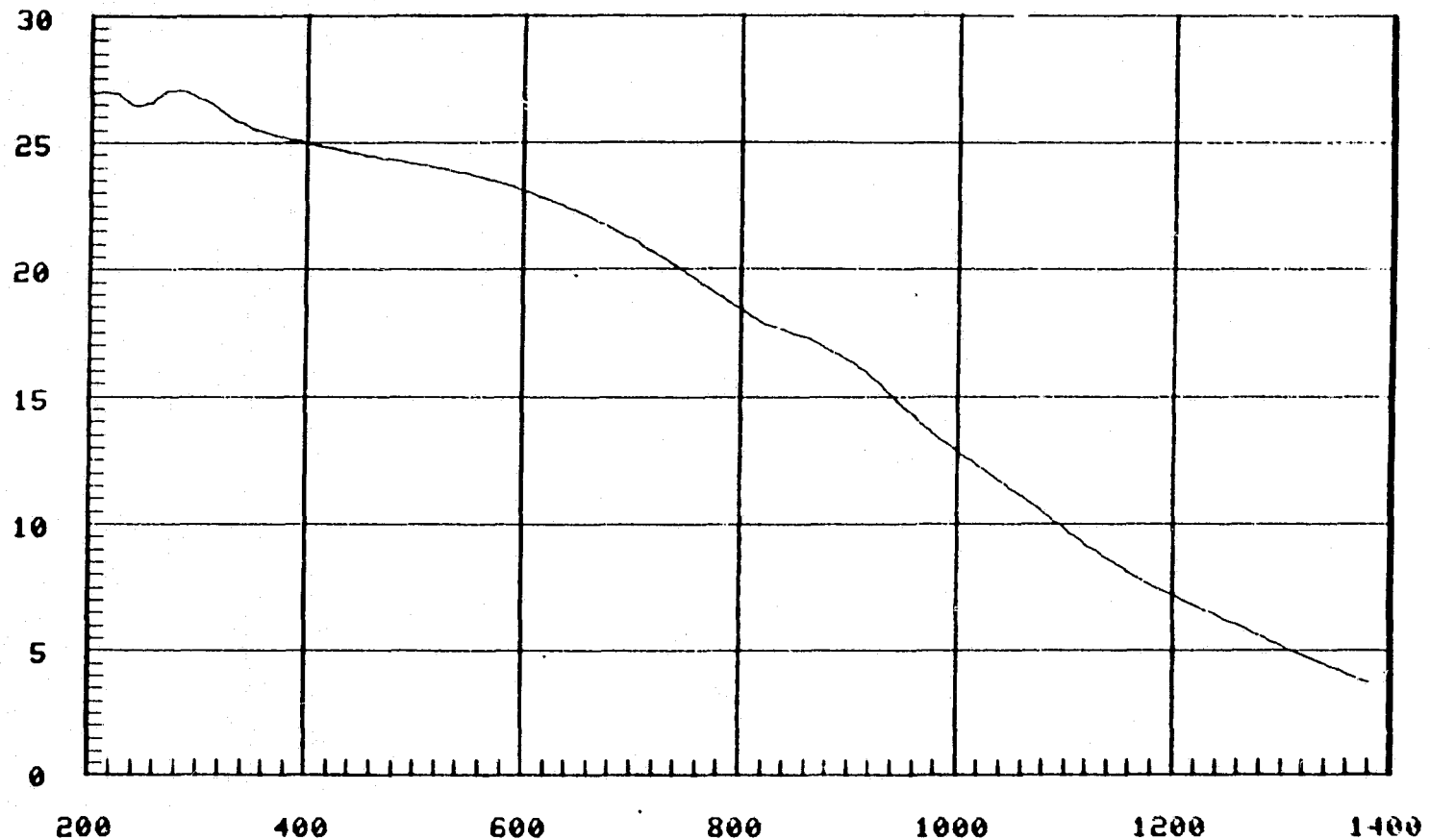
STS-3

200-1380 SEC

EGOT ZDEAWK

A-8

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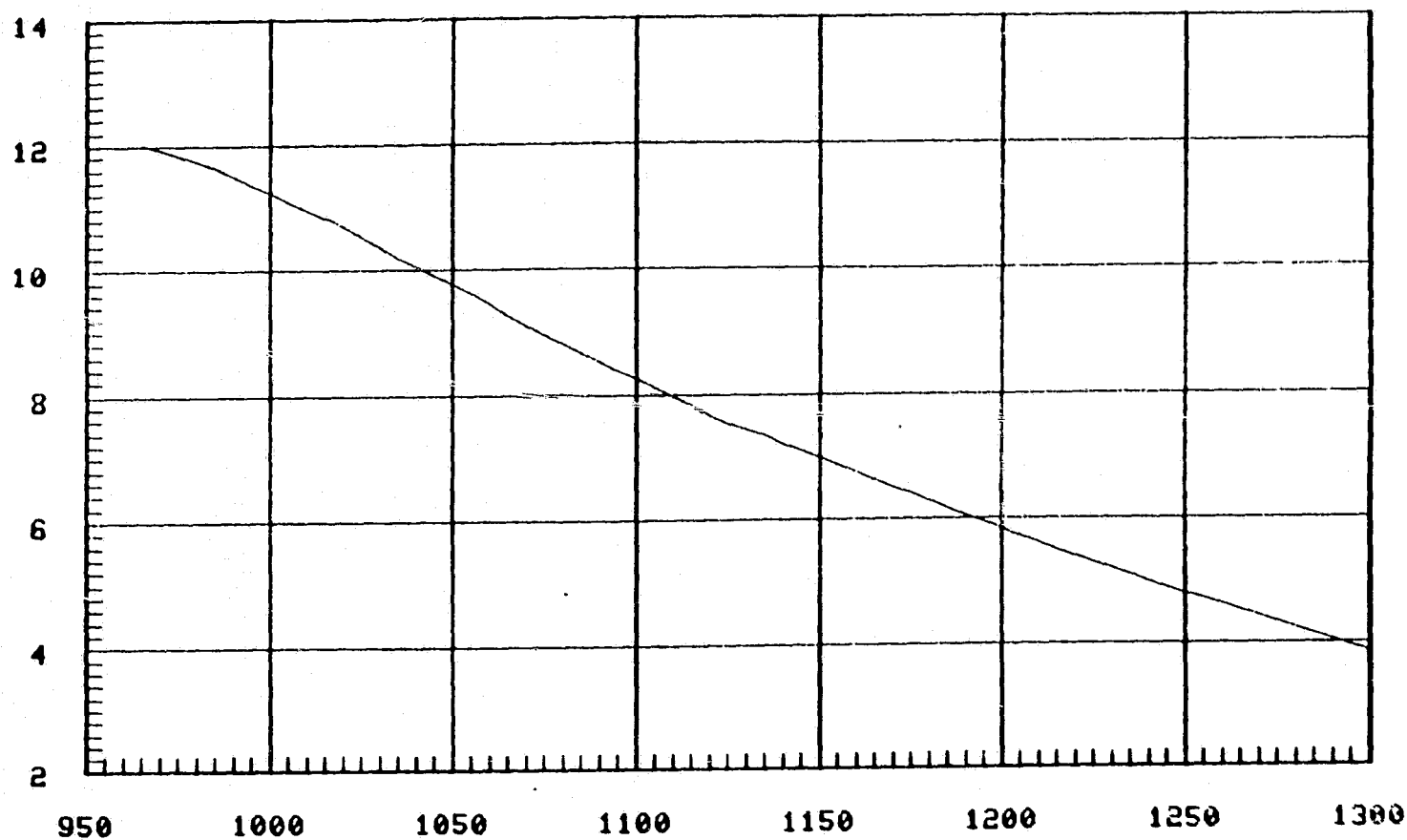
STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-4

965-1300 SEC

EDGE Z PLANE

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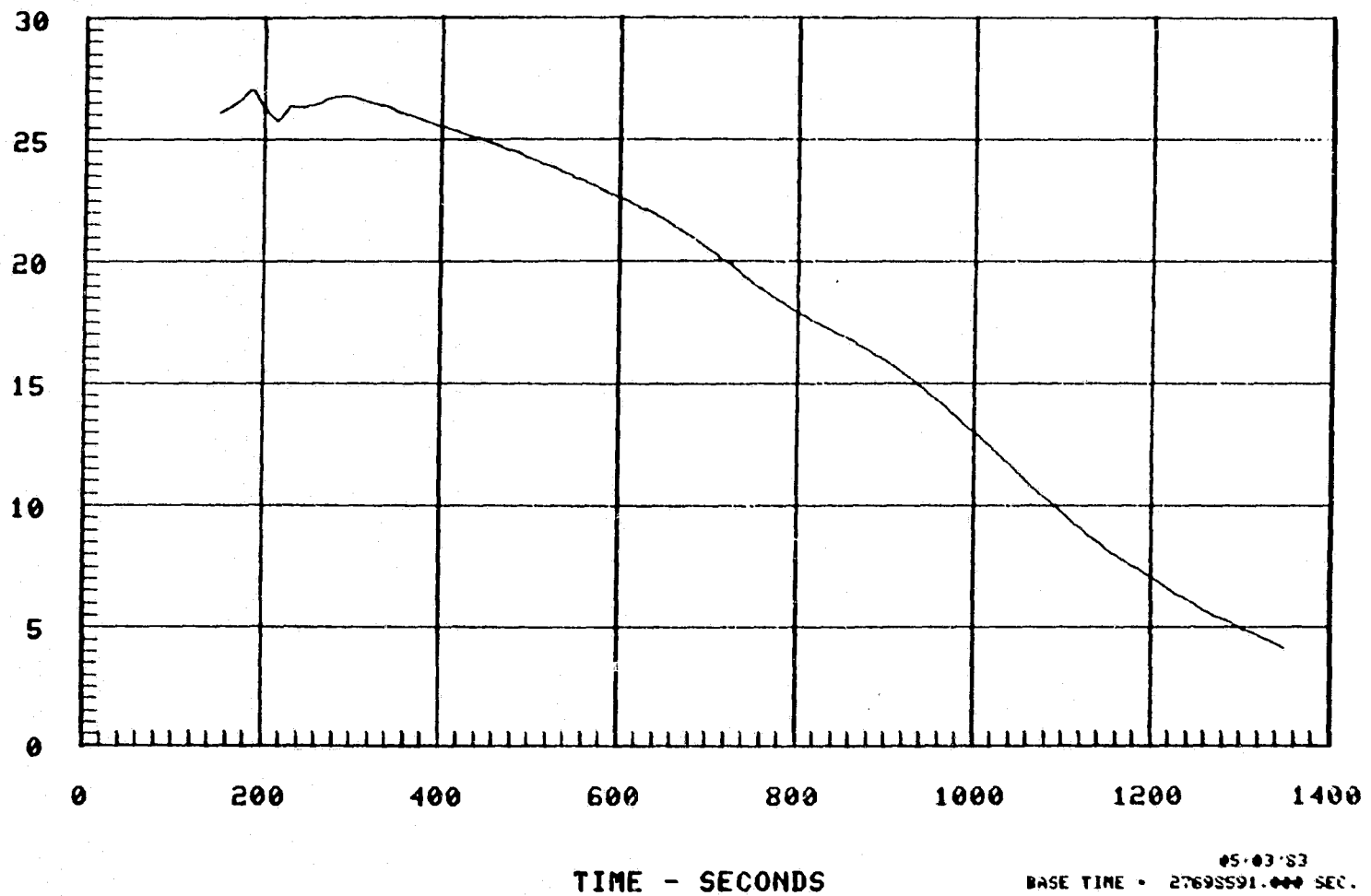
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—— STS-5

150-1350 SEC



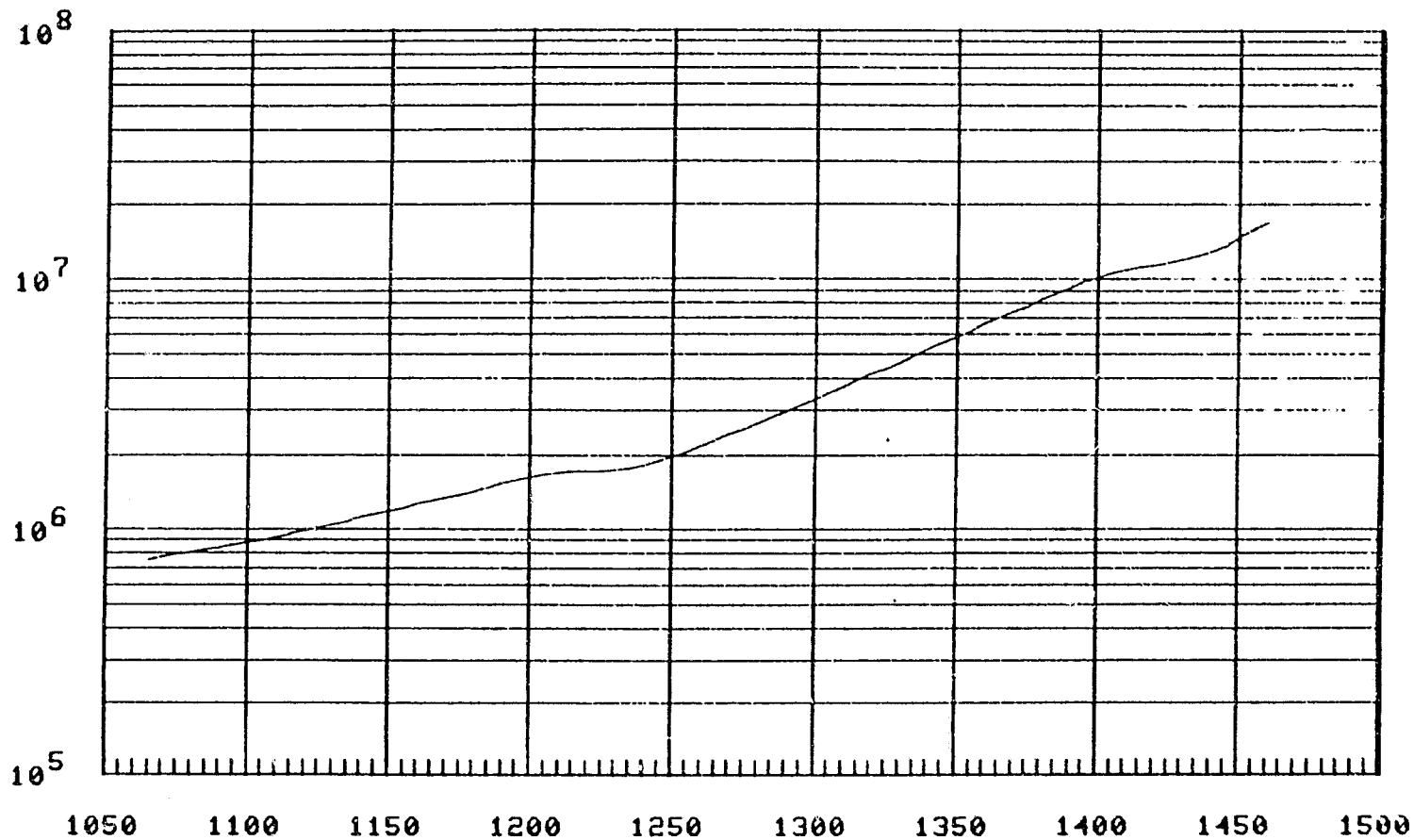
STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-1

1065-1460 SEC

REYNOLDS NUMBER (RS)

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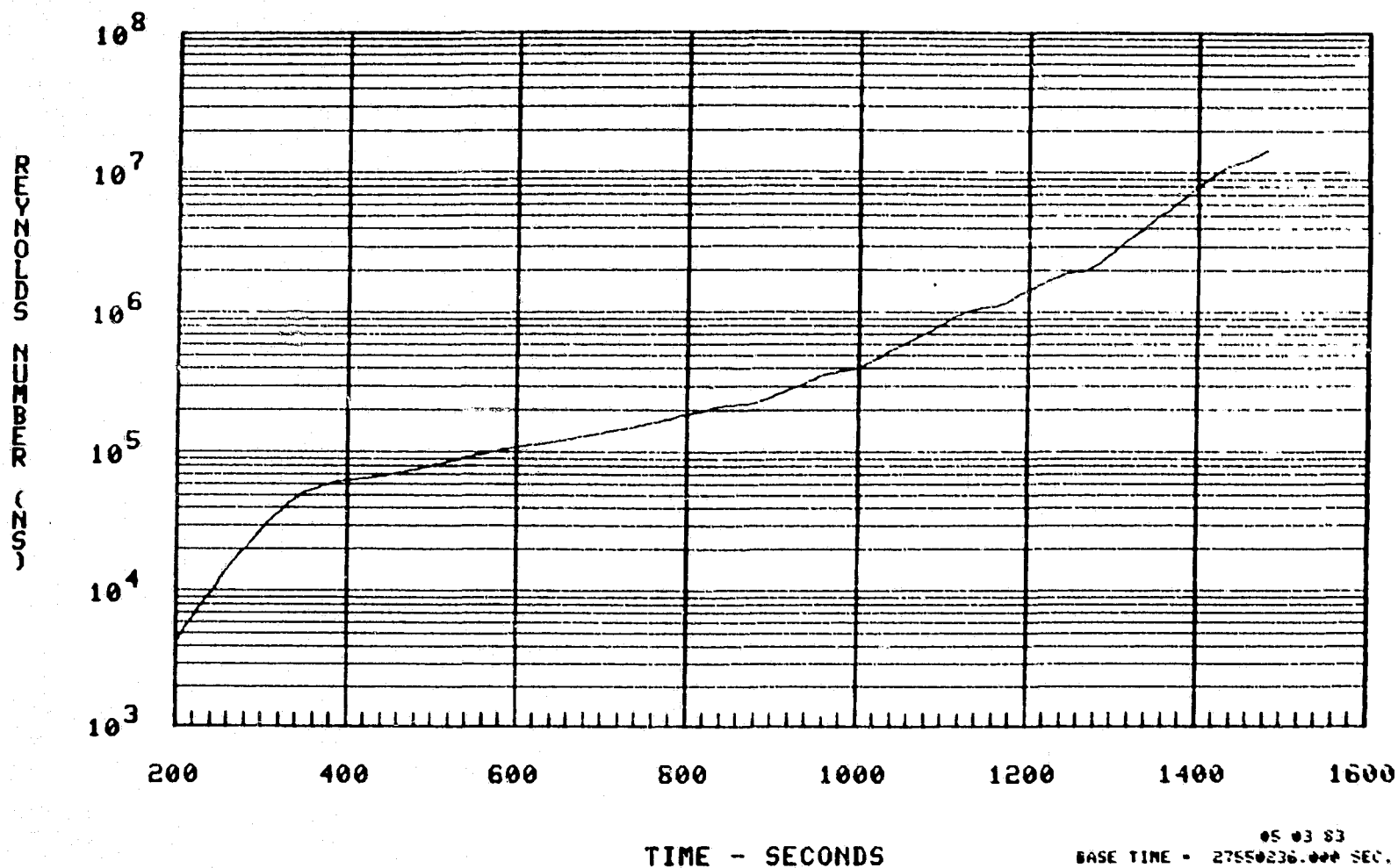
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STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-2

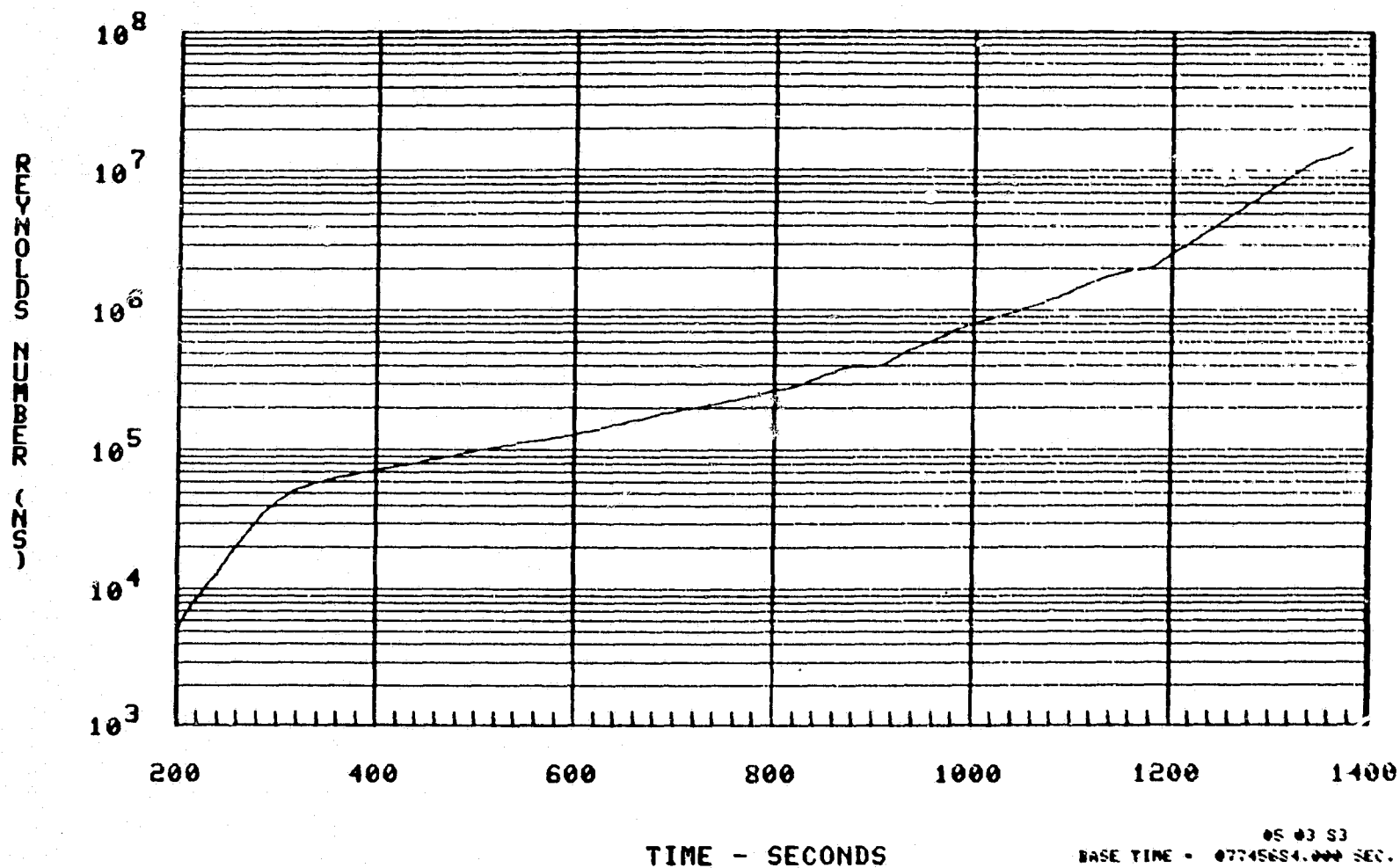
200-1480 SEC



STS-3 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-3

200-1380 SEC



GRAPH OF REYNOLDS NUMBER
VS. TIME

A-13

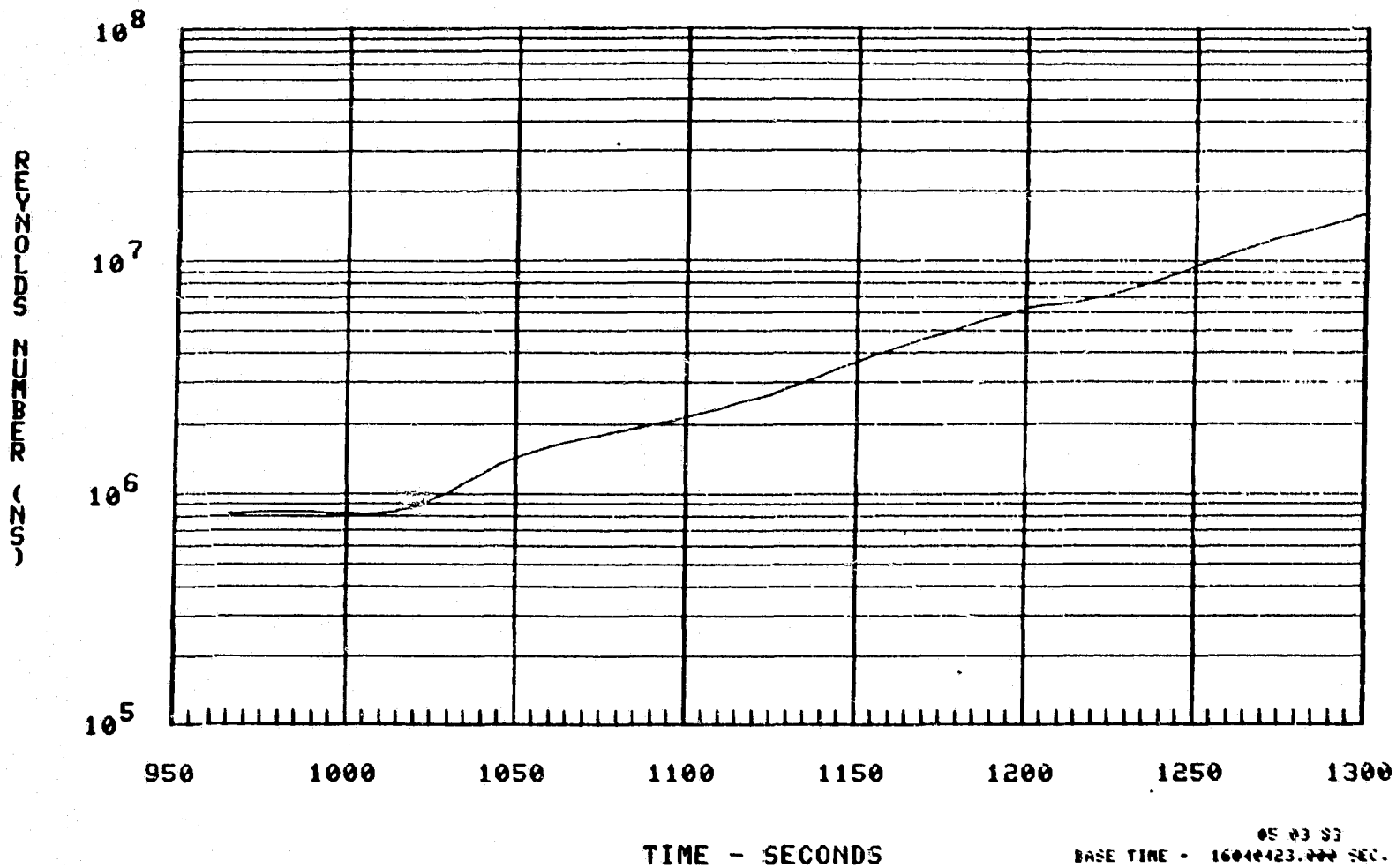
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STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-4

965-1300 SEC

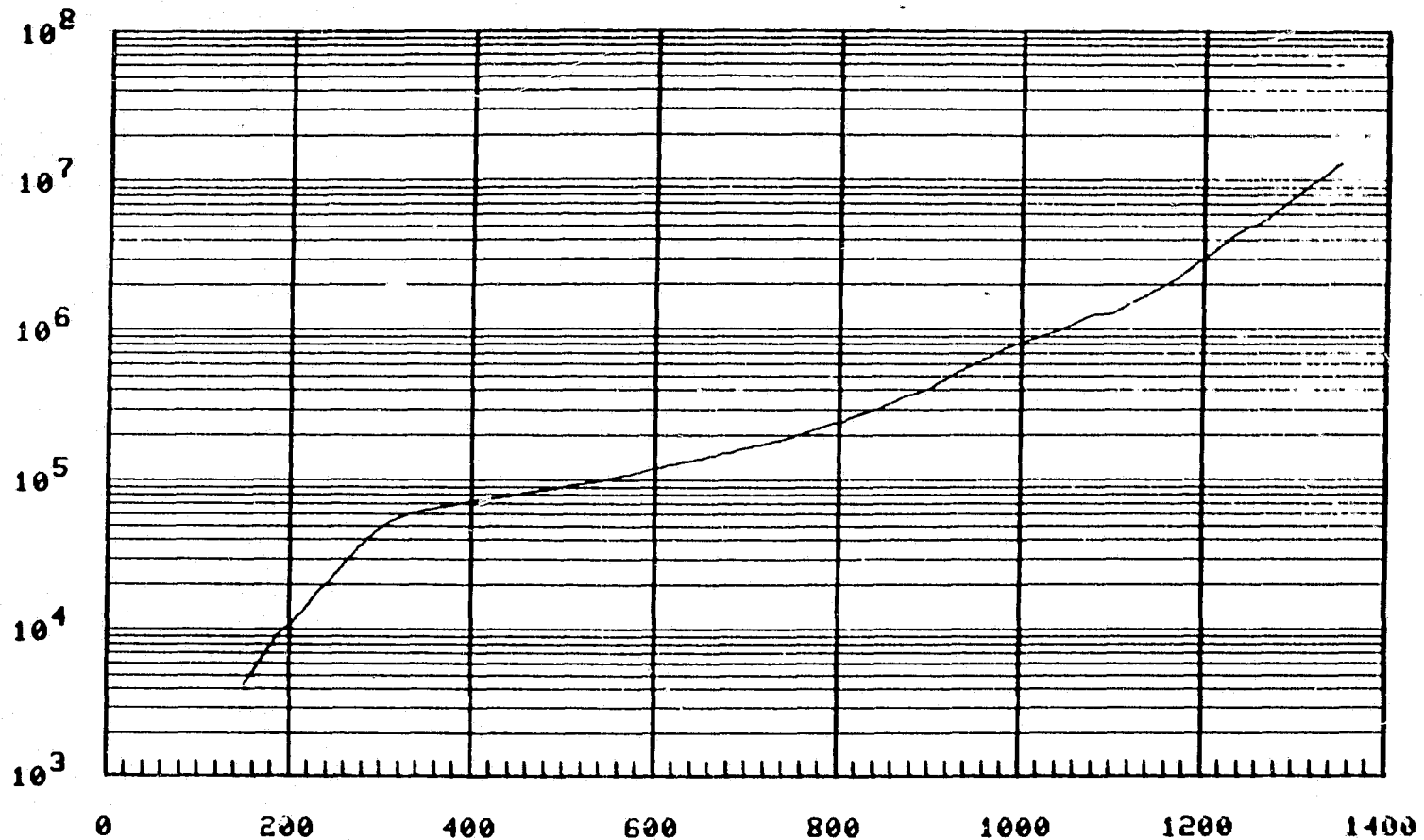


STS-5 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-5

150-1350 SEC

QUALITY NUMBER (QZS)



TIME - SECONDS

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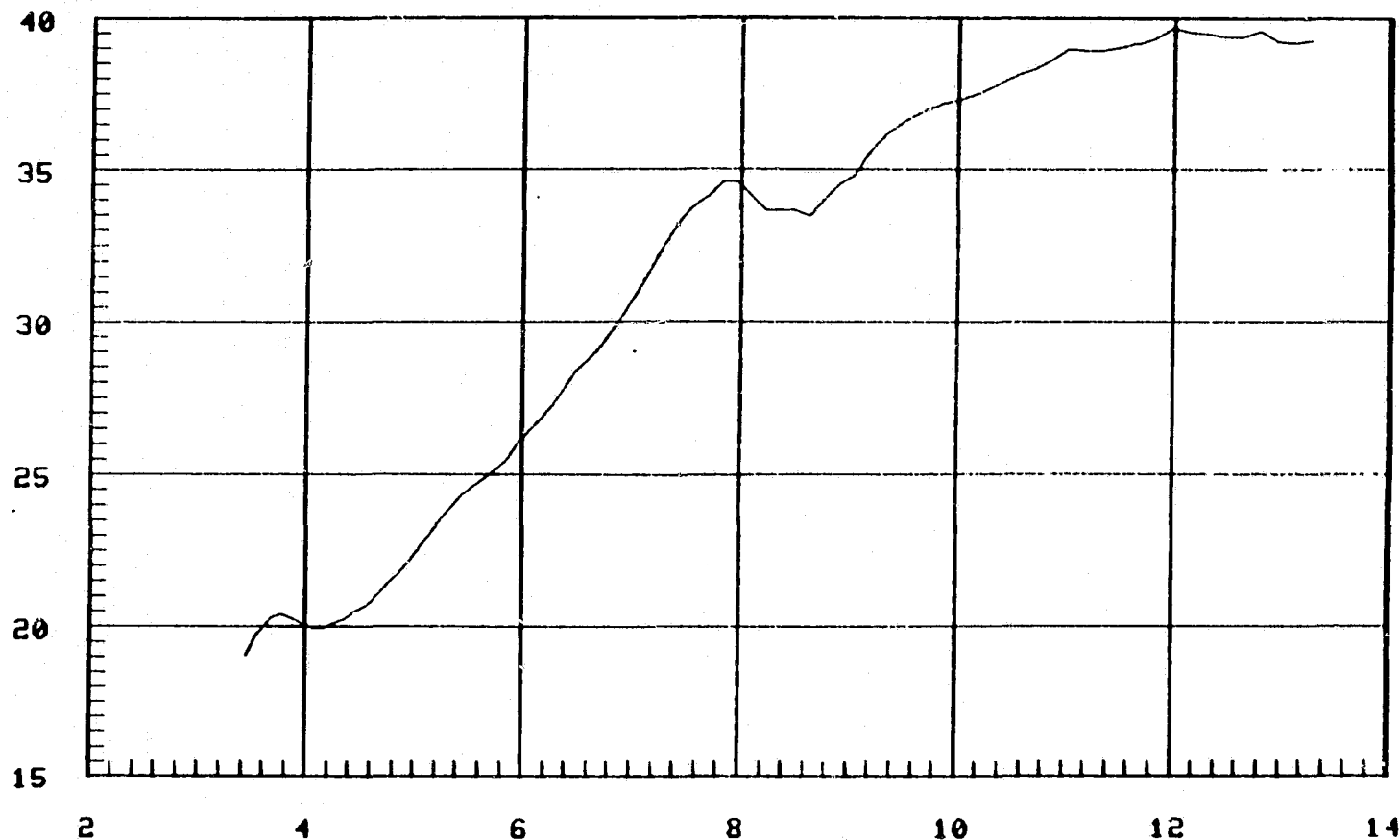
STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

———— STS-1

1065-1460 SEC

GEOMETRY-OL-CH-1-60 - DWS

A-16



MACH NUMBER

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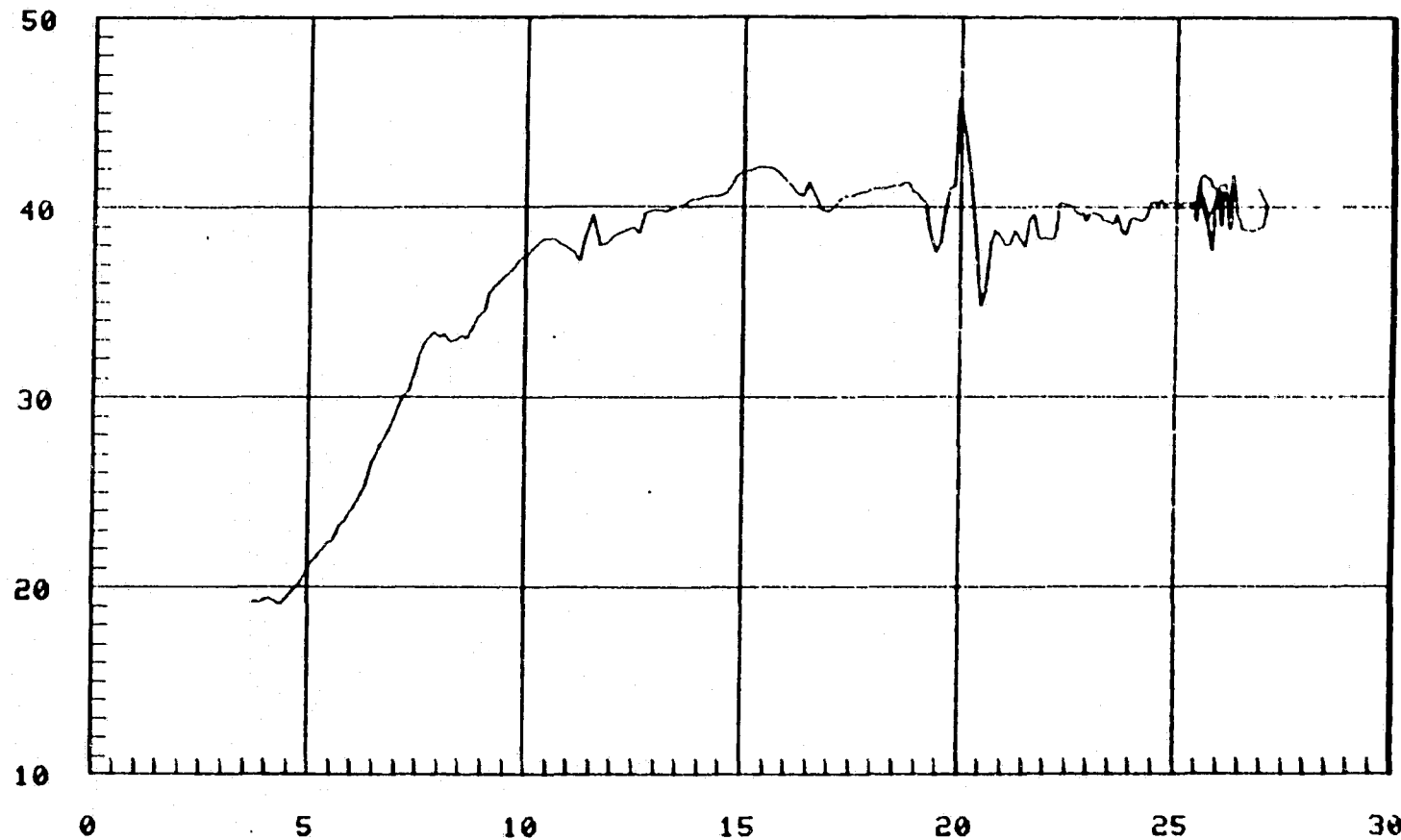
STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

———— STS-2

200-1480 SEC

ANGLE-OF-ATTACK -- DEG

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MACH NUMBER

05 03 83

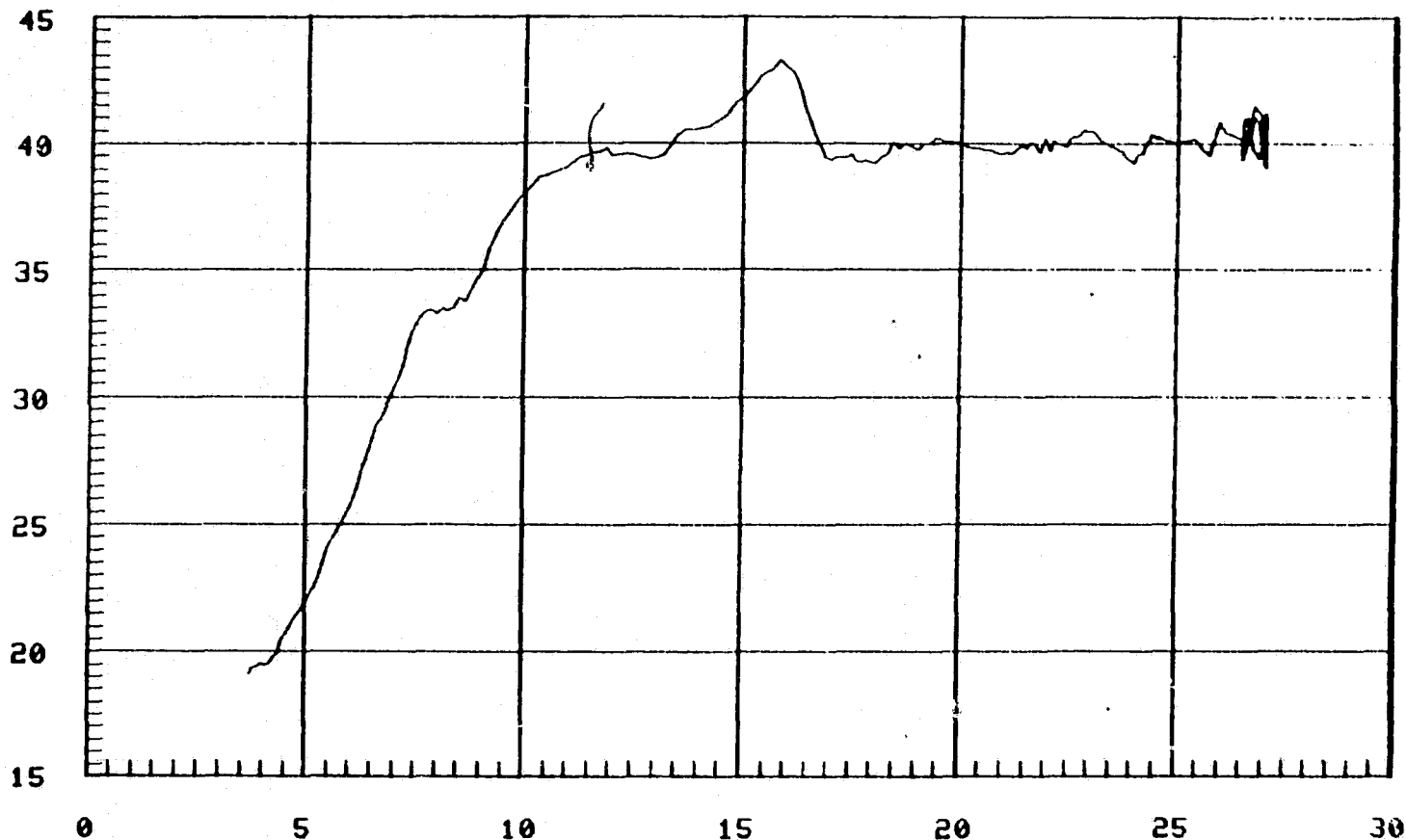
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STS-3 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-3

200-1380 SEC

ACCELERATION - DEG



MACH NUMBER

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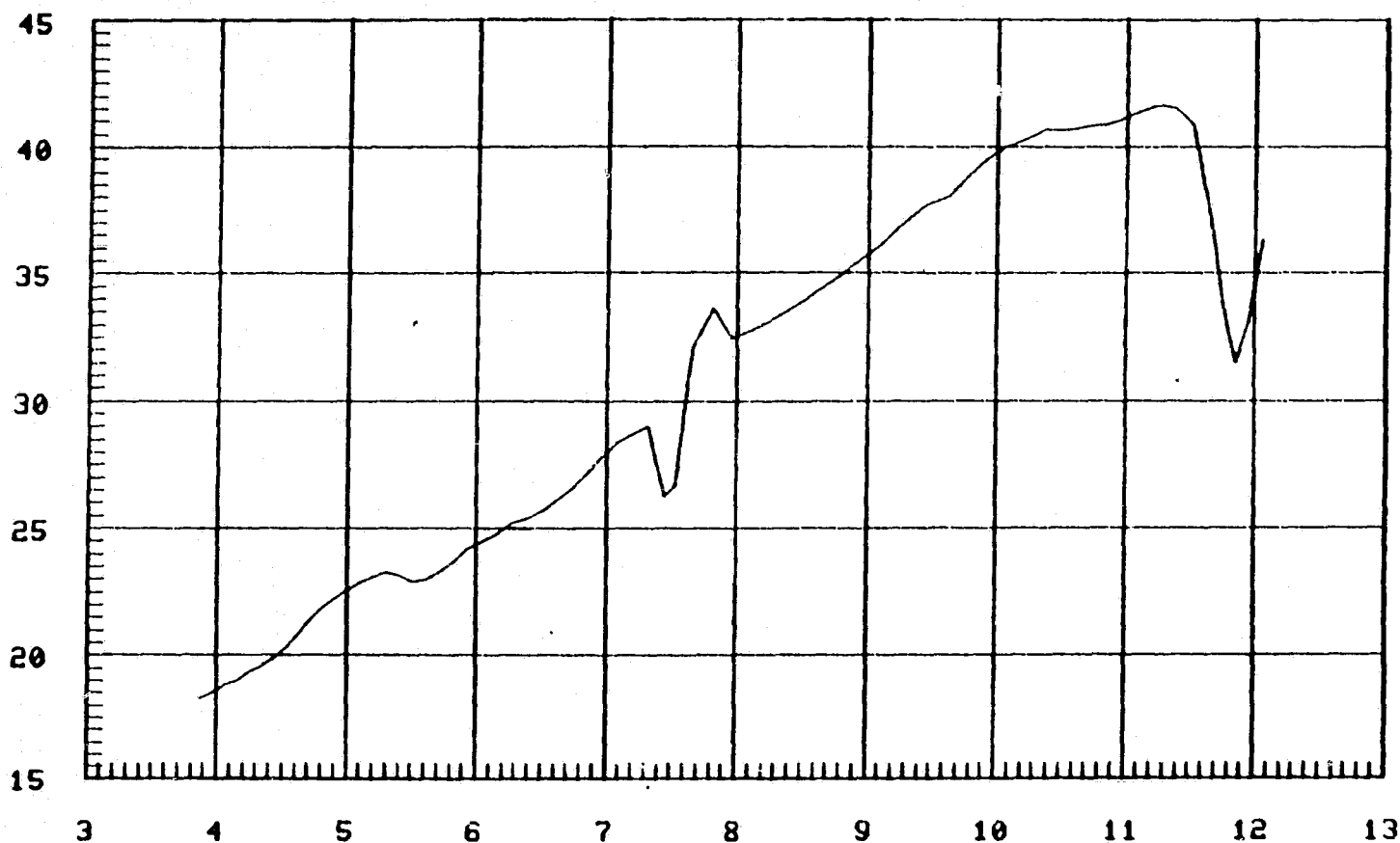
STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-4

965-1300 SEC

ANGLE-OF-ATTACK - DEG

ANGLE-OF-ATTACK - DEG



MACH NUMBER

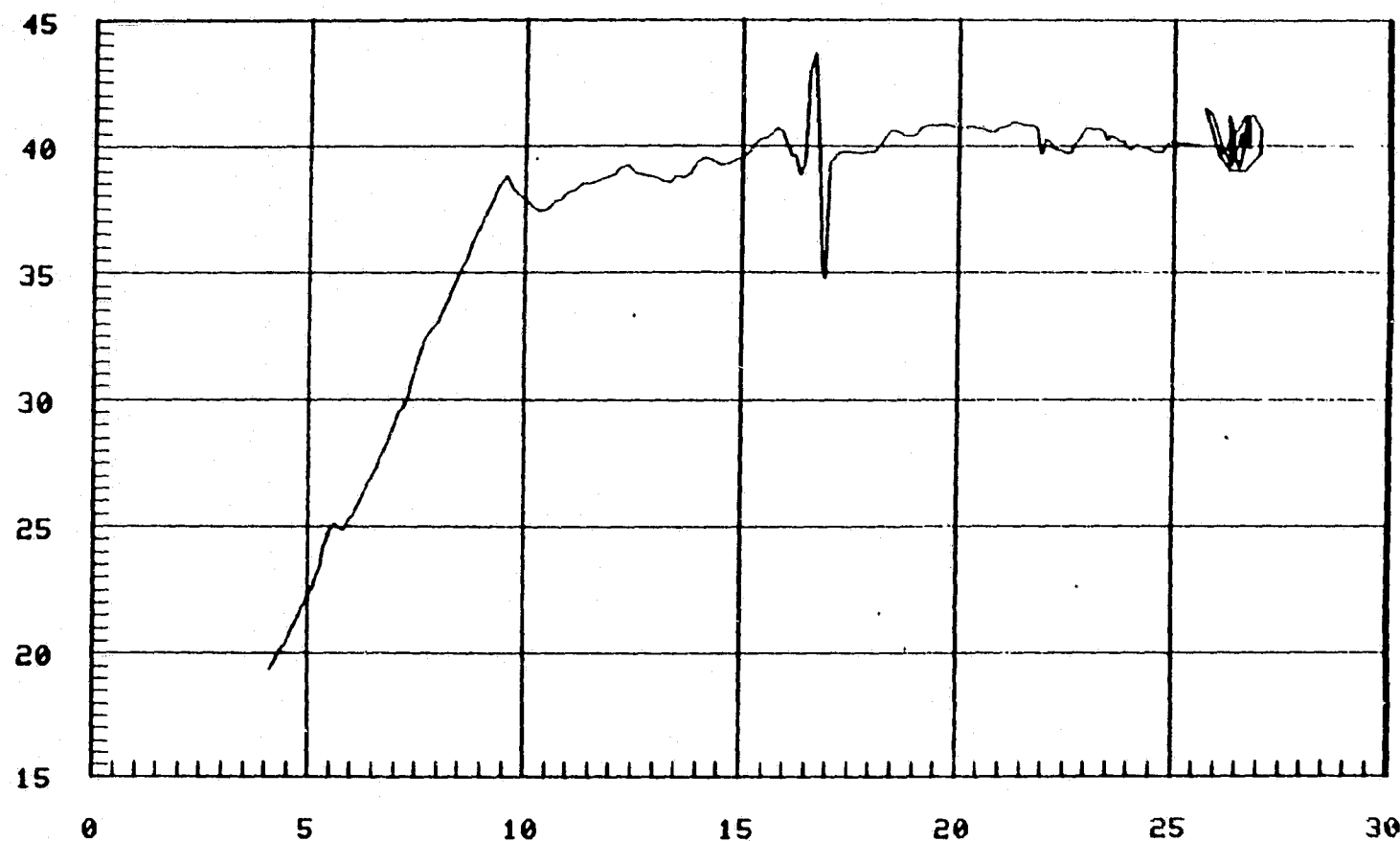
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STS-5 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-5

150-1350 SEC

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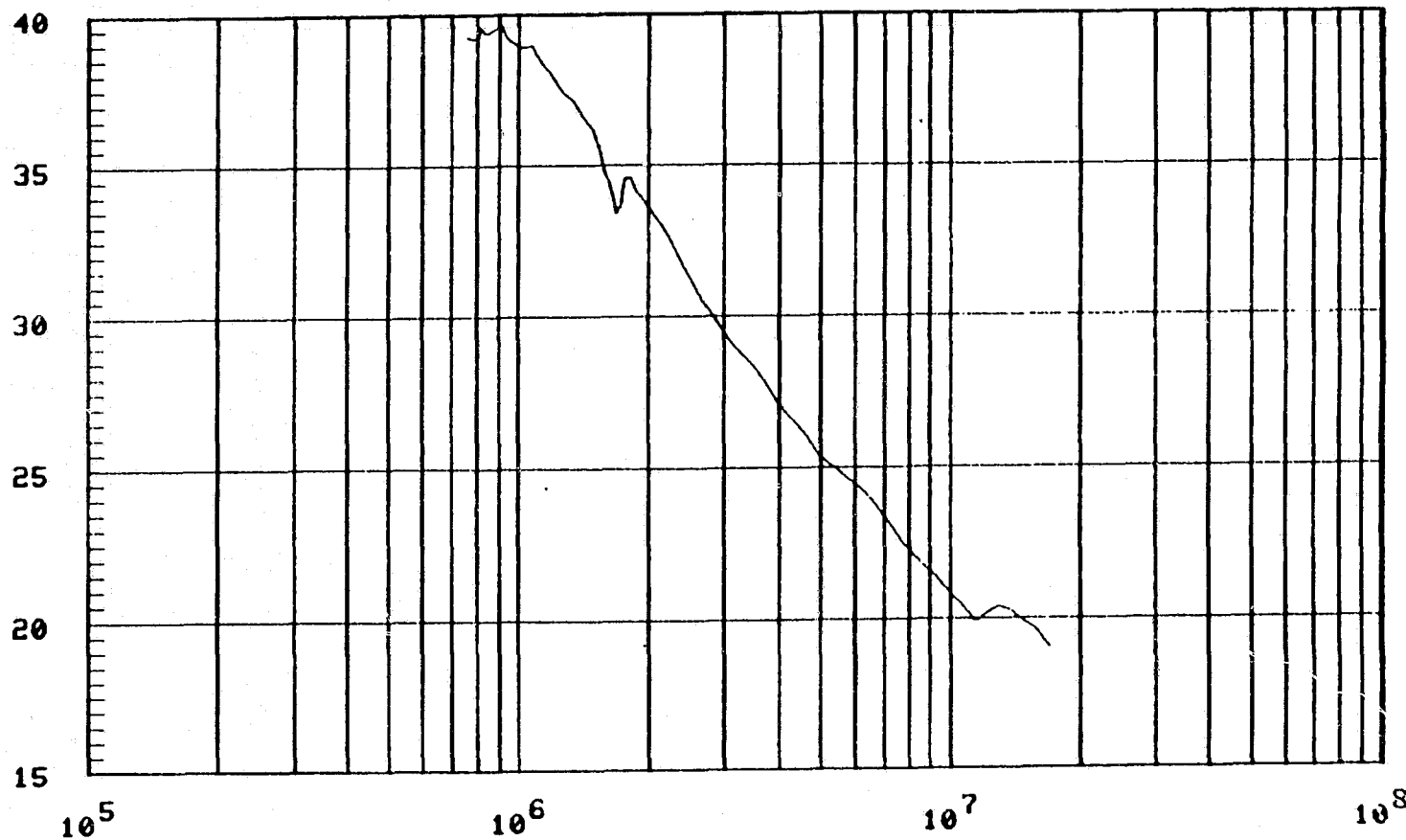
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STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-1

1065-1460 SEC

ANGLE-OF-ATTACK : DEG



REYNOLDS NUMBER (NS)

05 03 '83

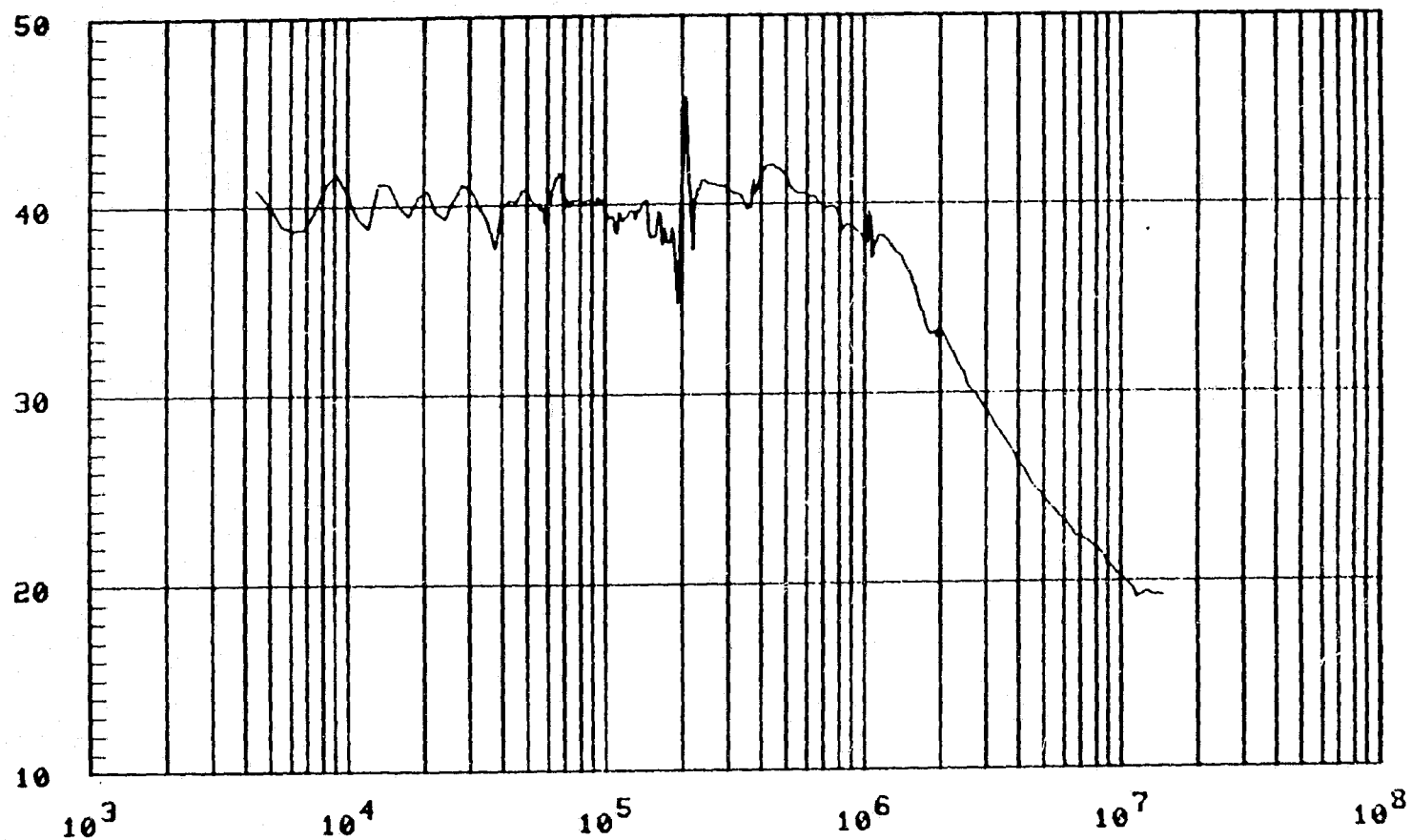
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STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-2

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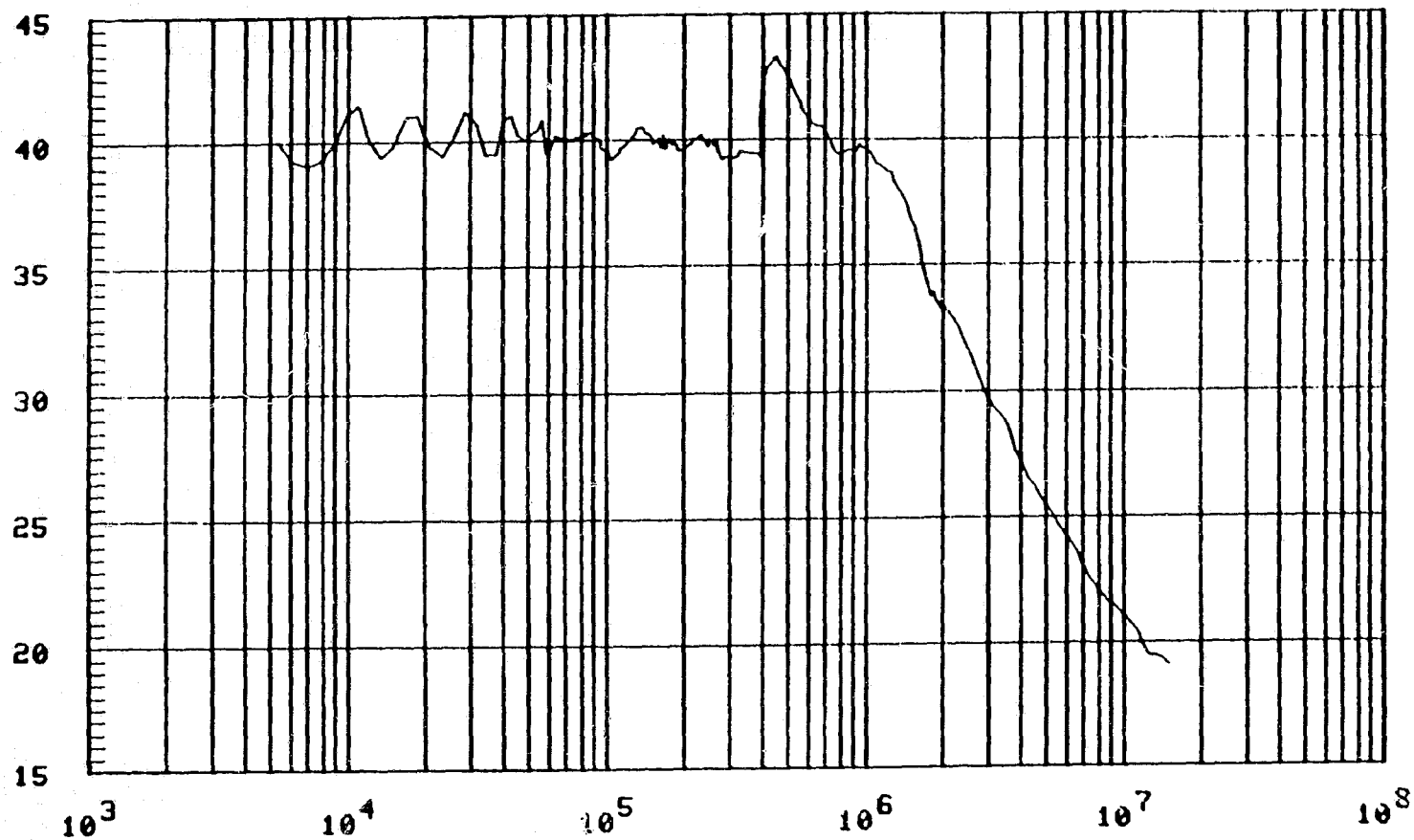
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STS-3

200-1380 SEC

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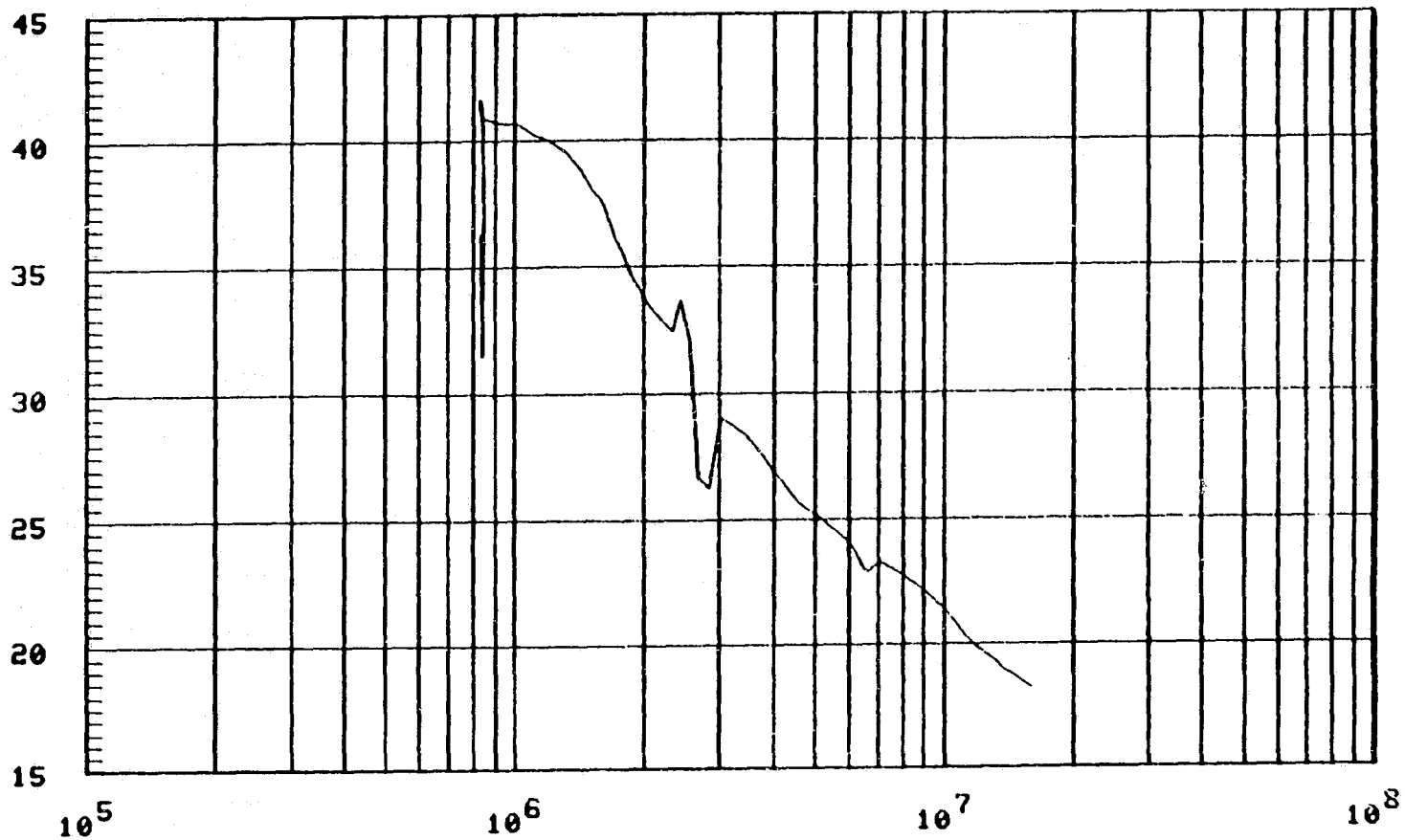
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STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

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965-1300 SEC

ANGLE-OF-ATTACK - DEG



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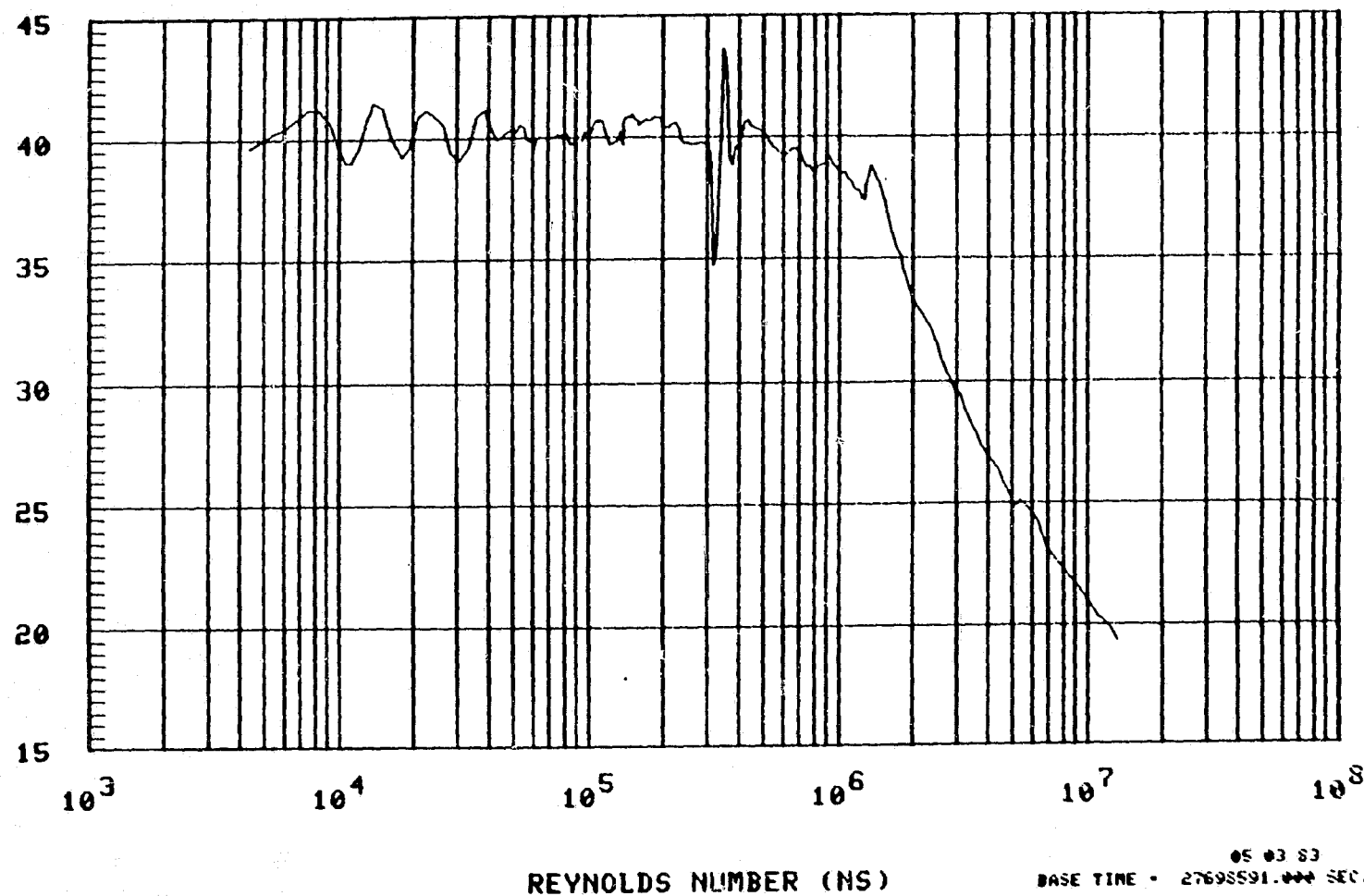
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STS-5

150-1350 SEC

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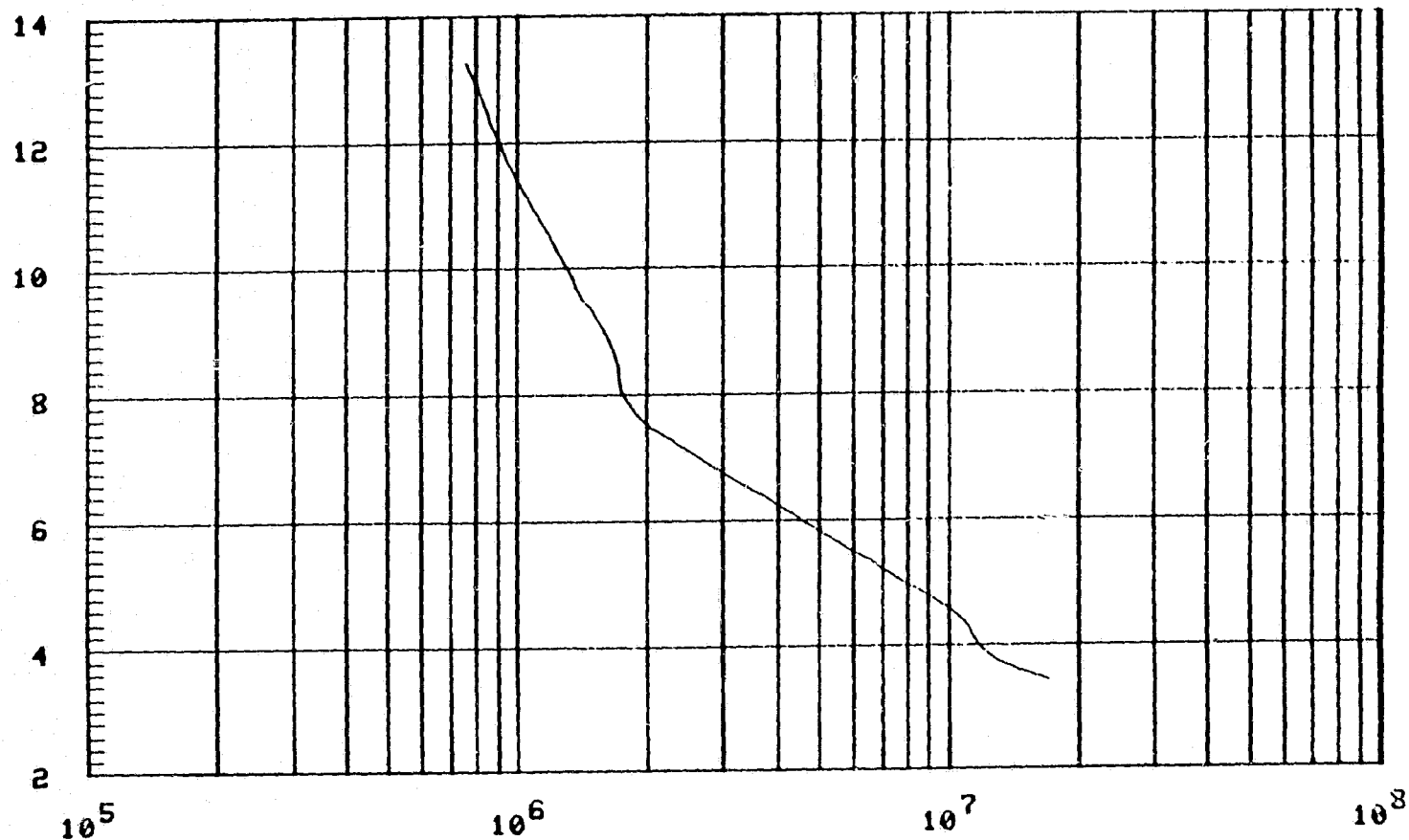
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1065-1460 SEC



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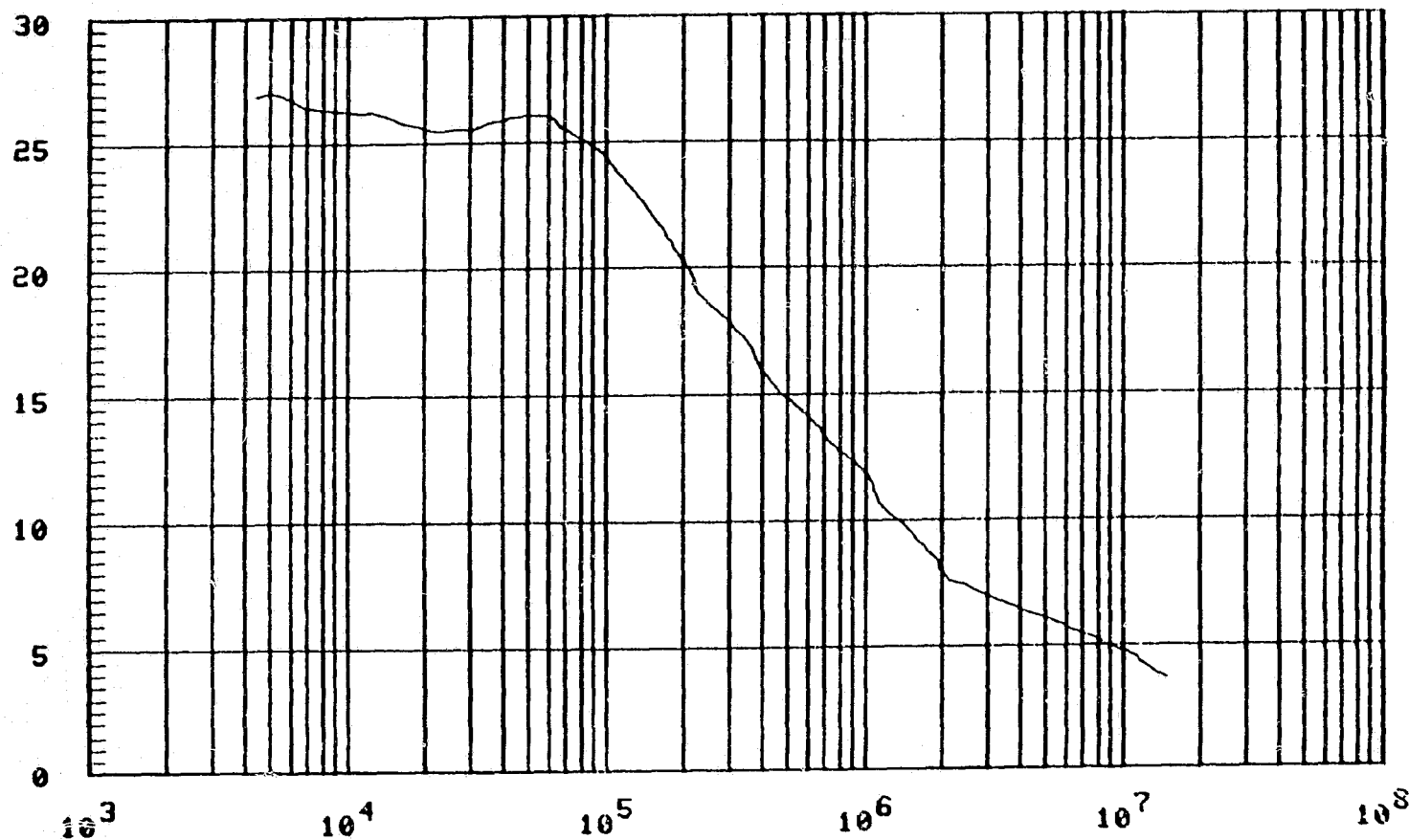
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STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-2

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REYNOLDS NUMBER



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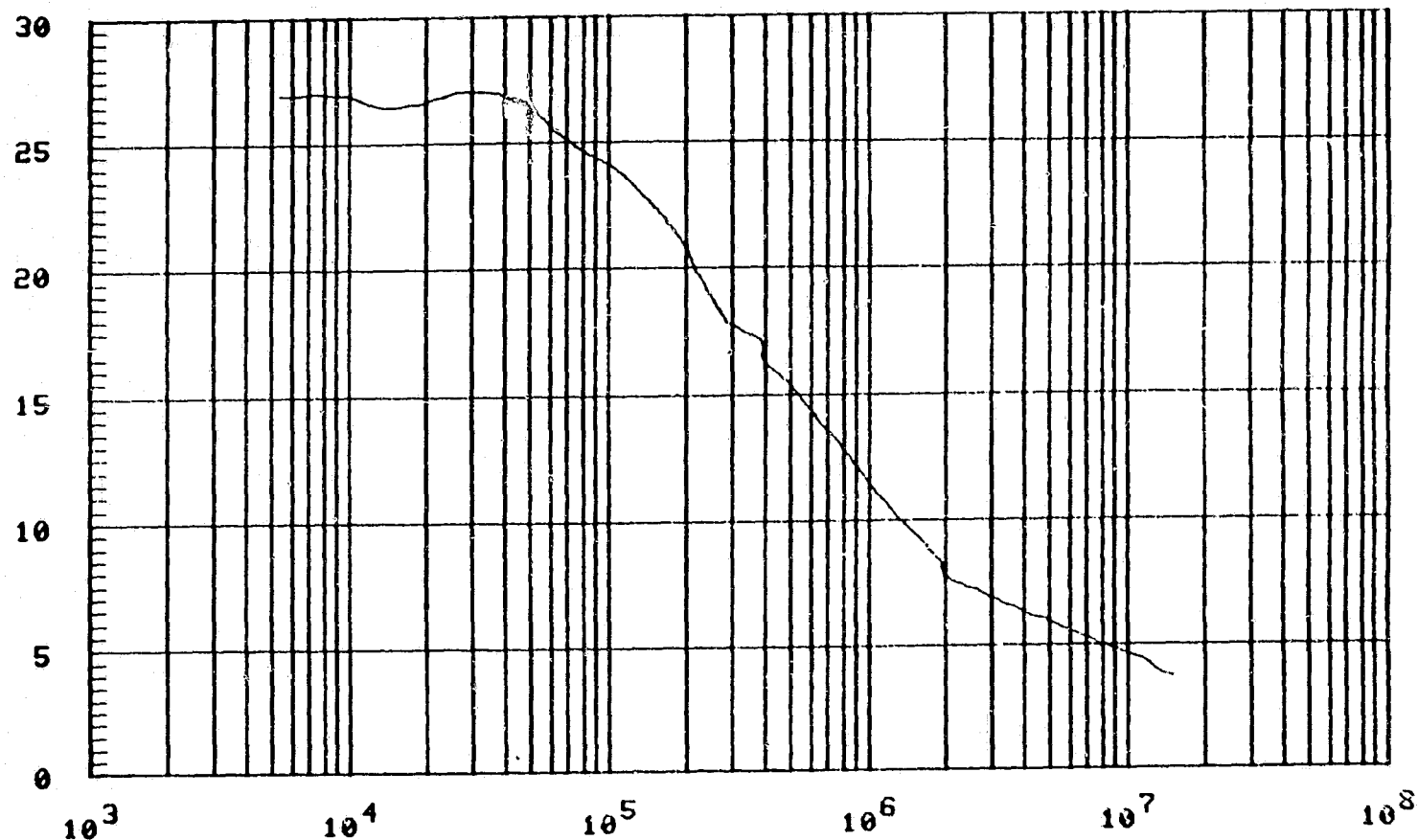
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STS-3

200-1380 SEC

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A-28



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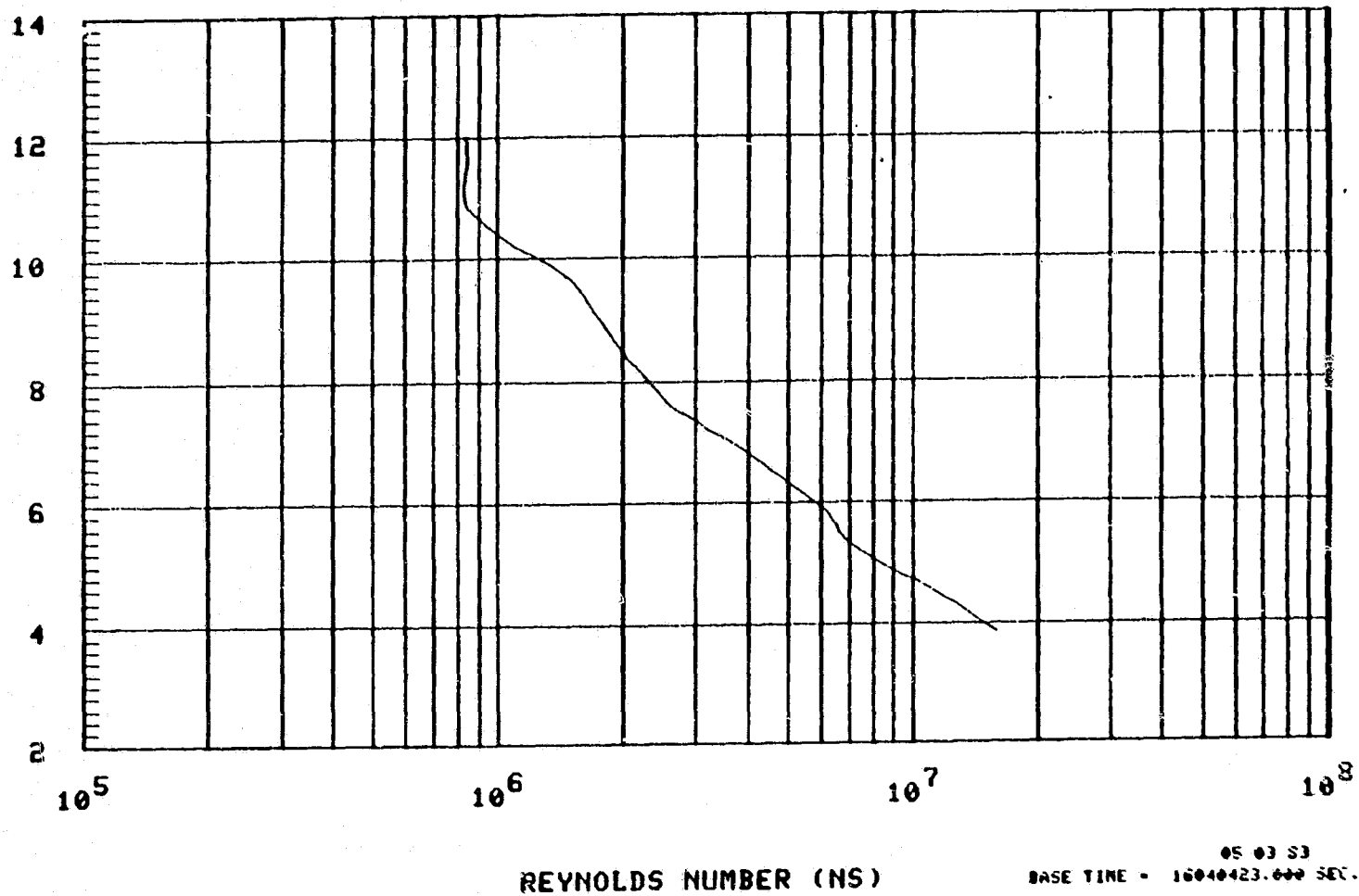
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965-1300 SEC

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A-29

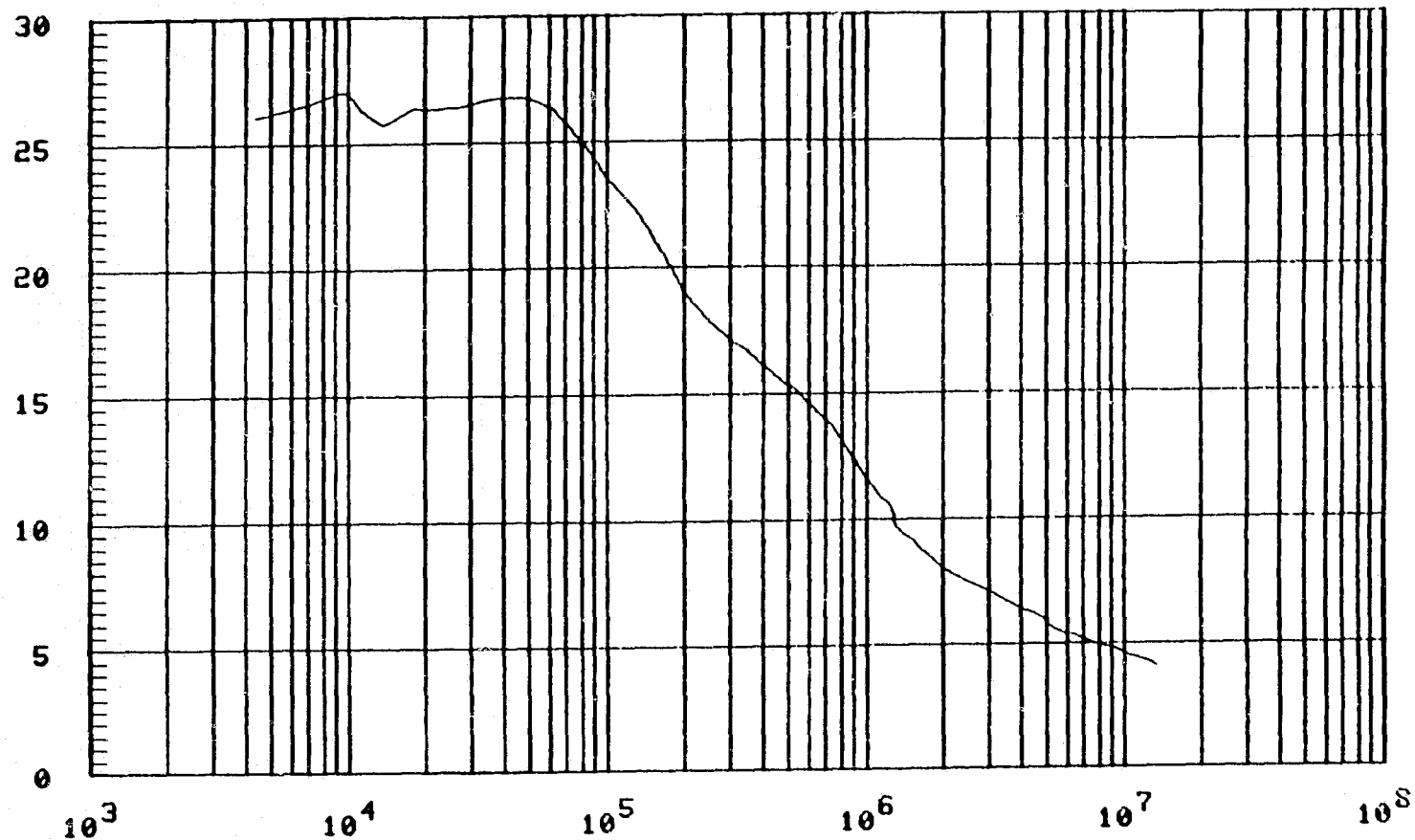
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STS-5 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

STS-5

150-1350 SEC



REYNOLDS NUMBER (NS)

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A-30

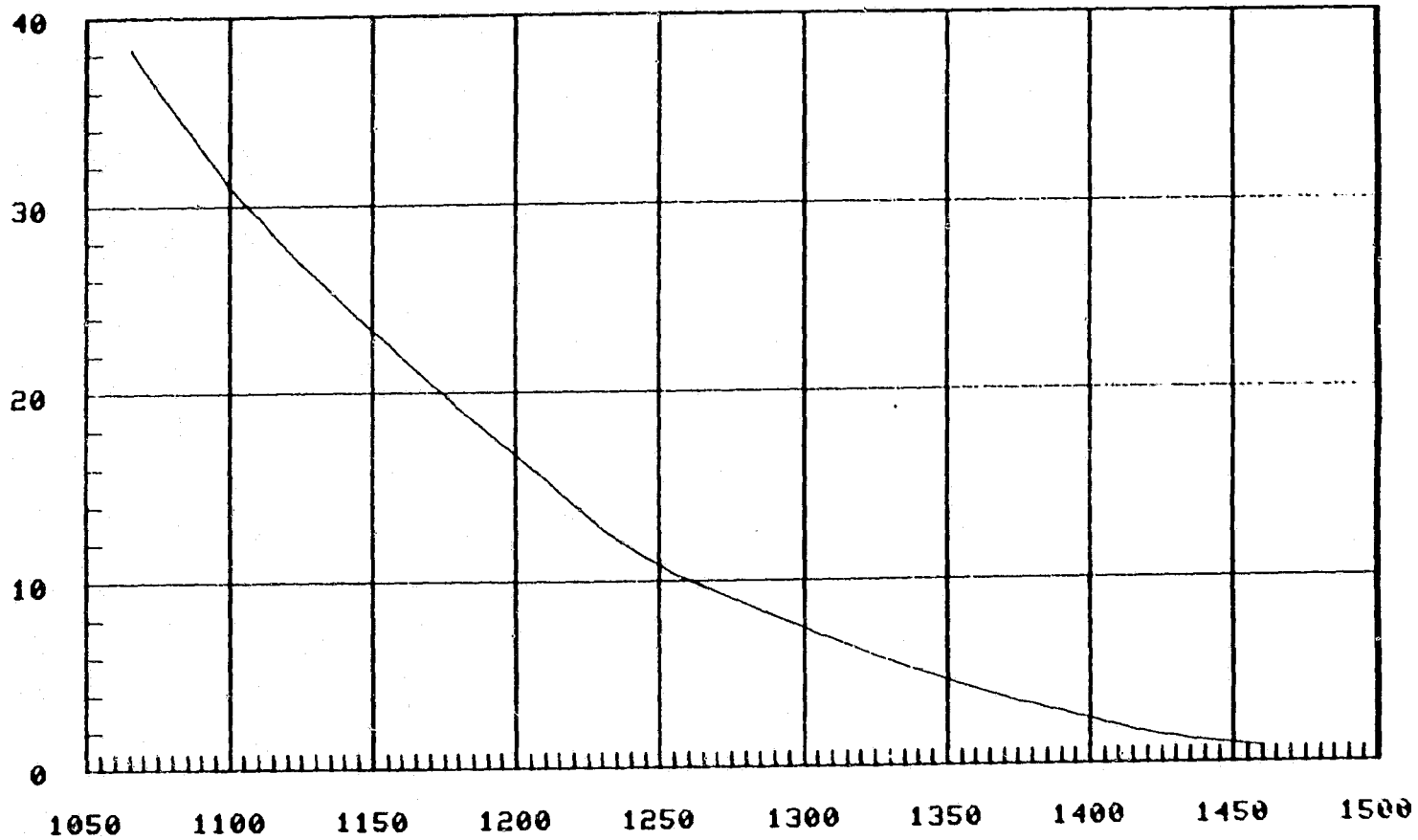
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— QREF

HEATING RATE : Btu/ft² : SEC



TIME - SECONDS

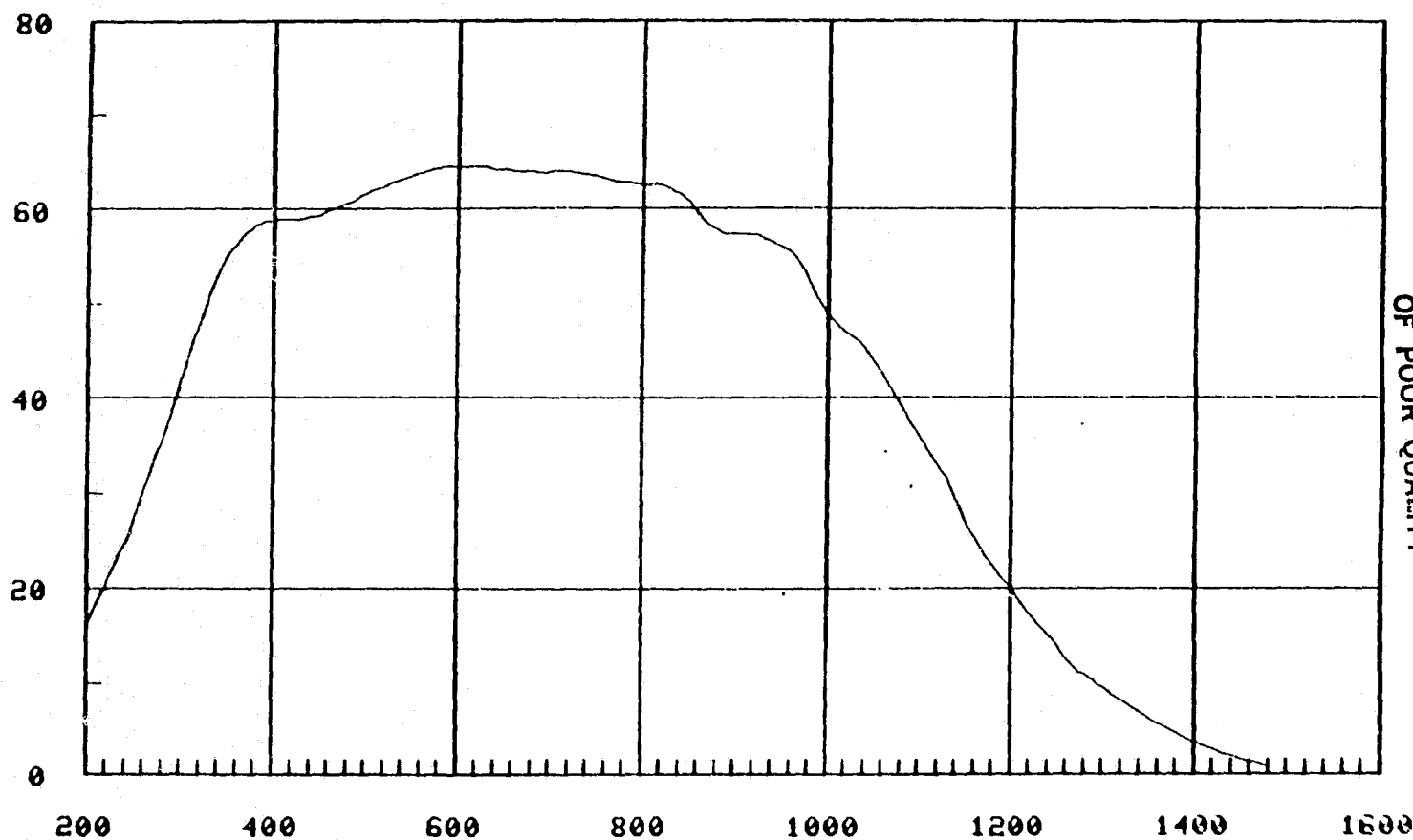
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STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

QREF

WINGING RATE - ALTITUDE - SEC



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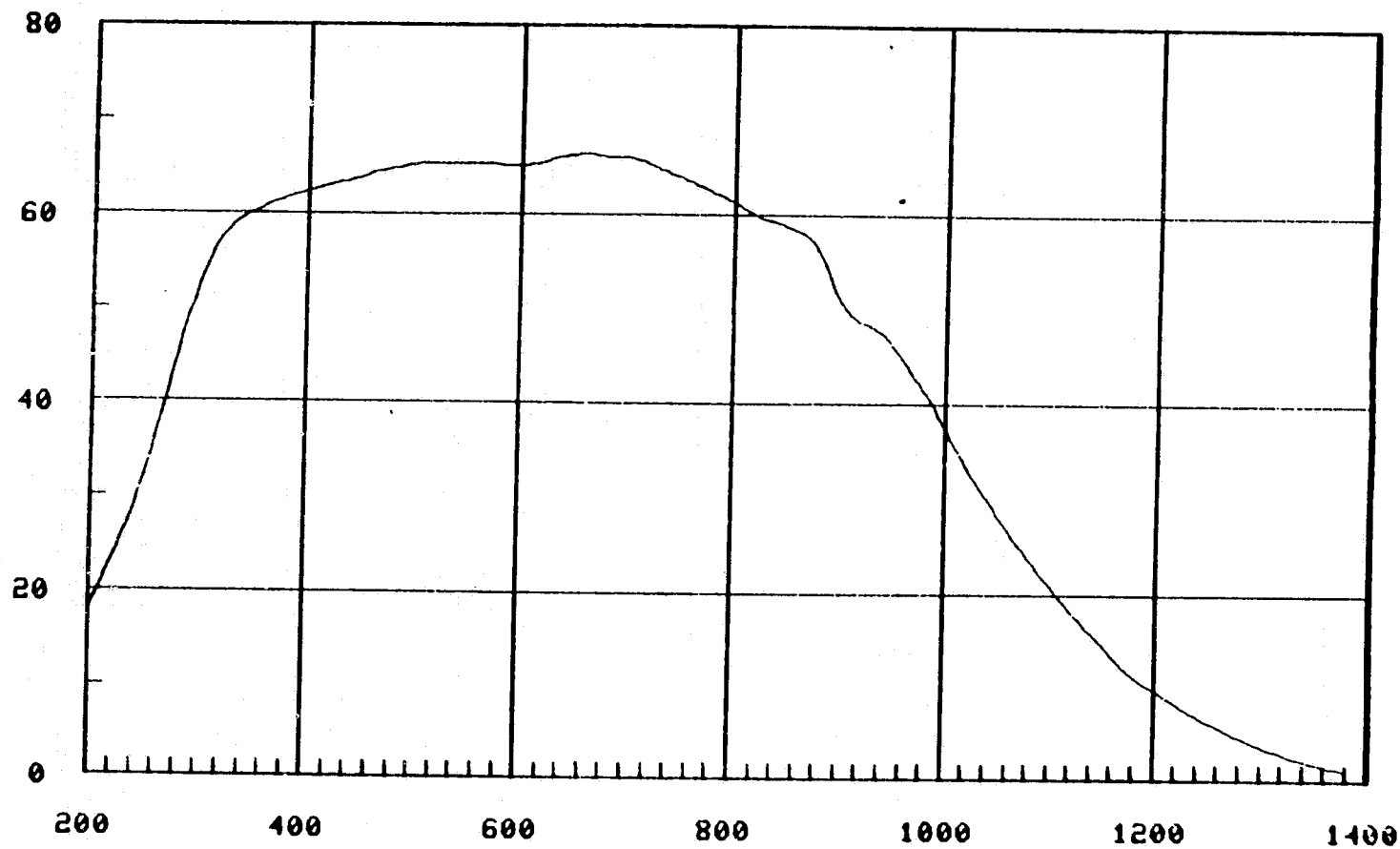
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STS-3 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

QREF

FLIGHTING REF - B-70/ST-107 - SMC

A-33



TIME - SECONDS

05 03 53

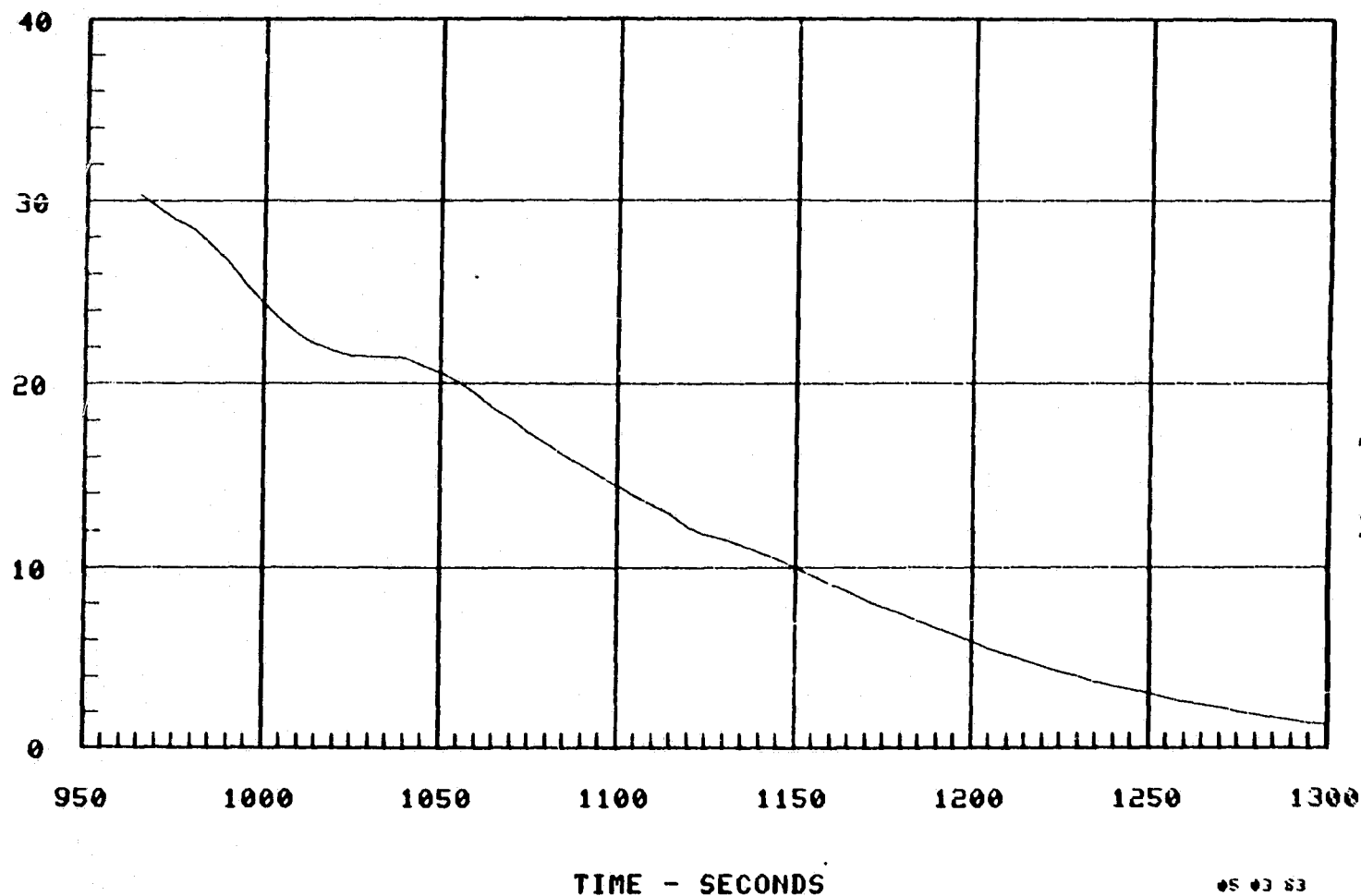
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FLIGHTING REFERENCE - BUTTERFLY - SEC

A-34

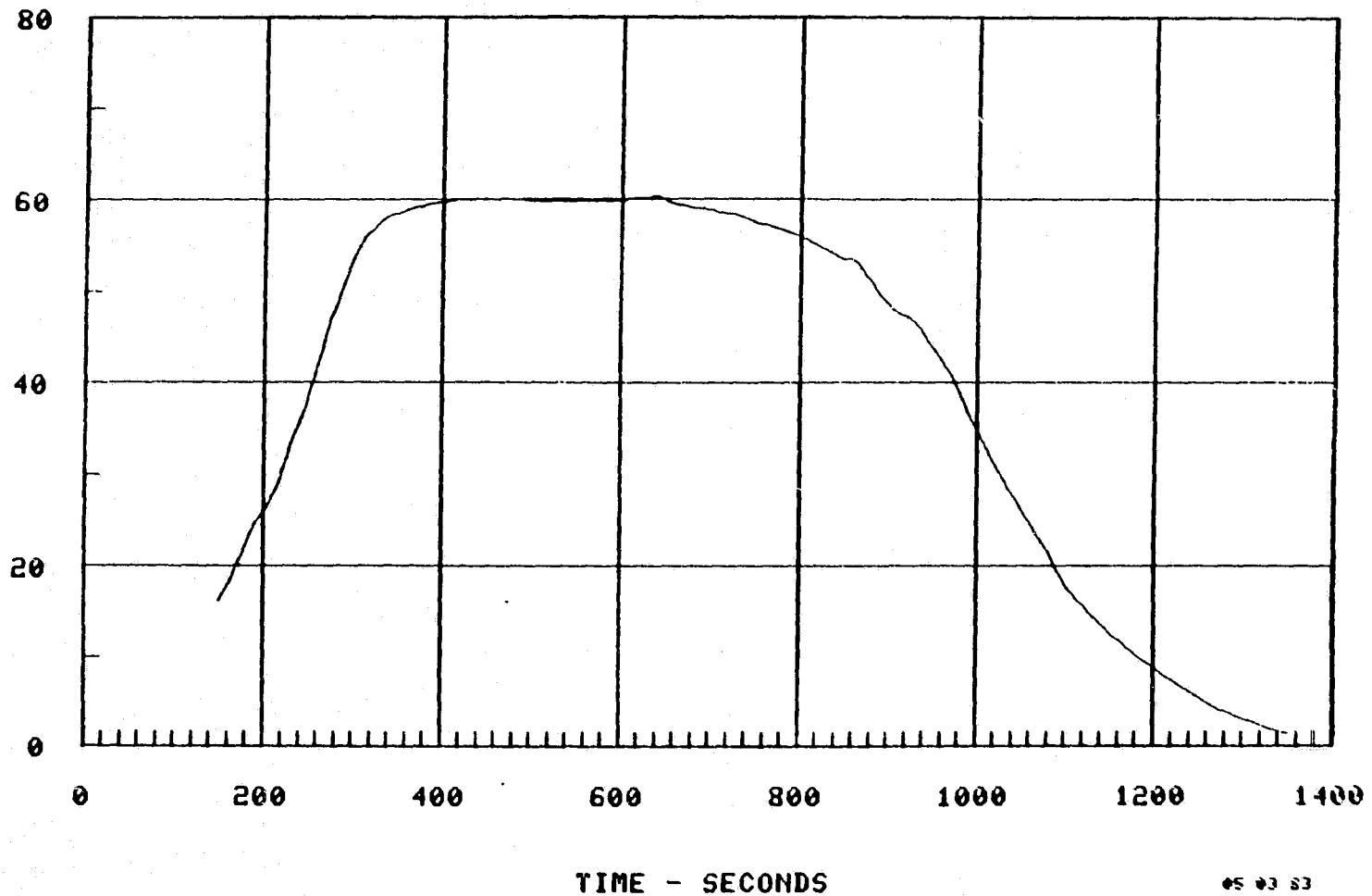


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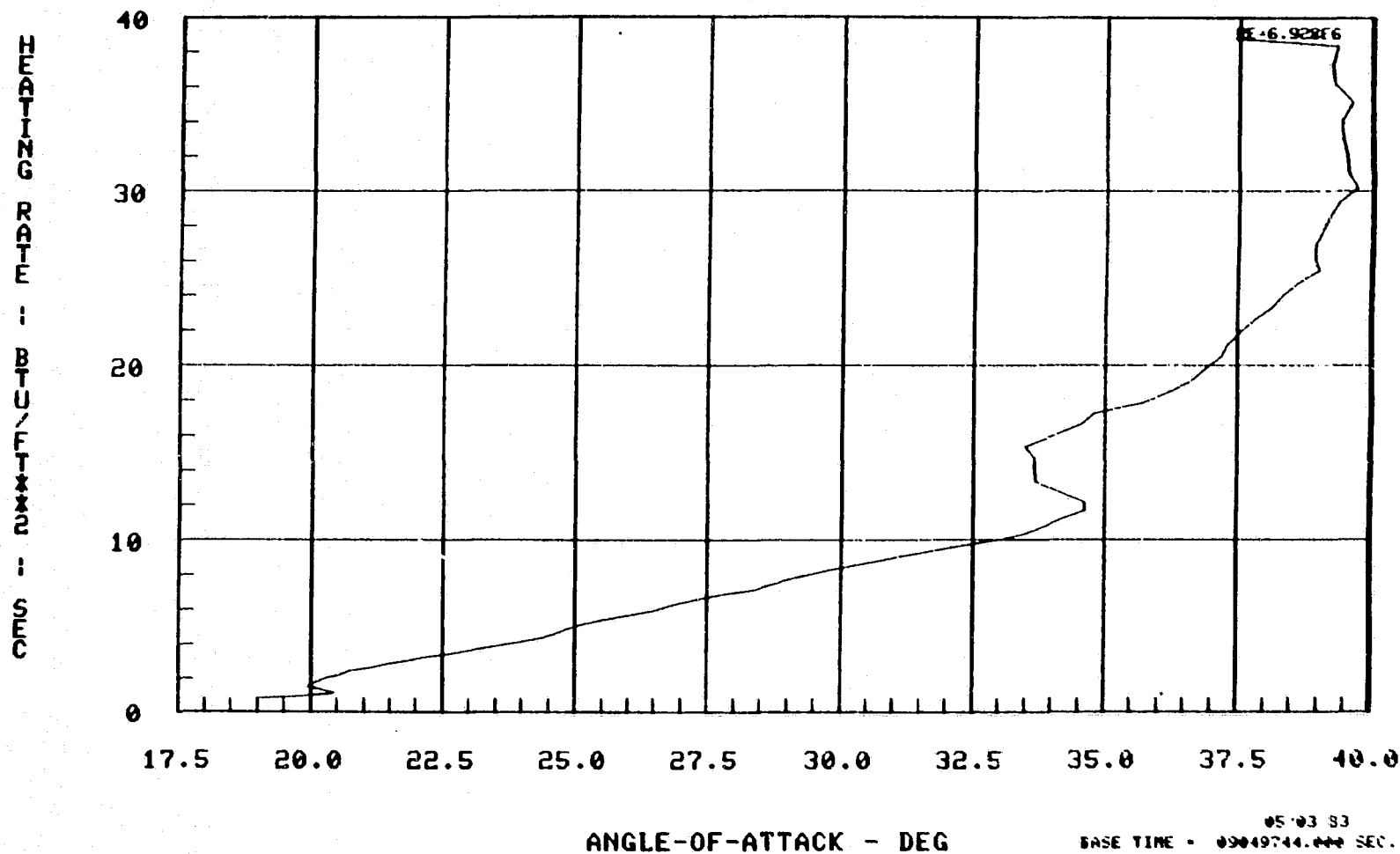


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1065-1460 SEC



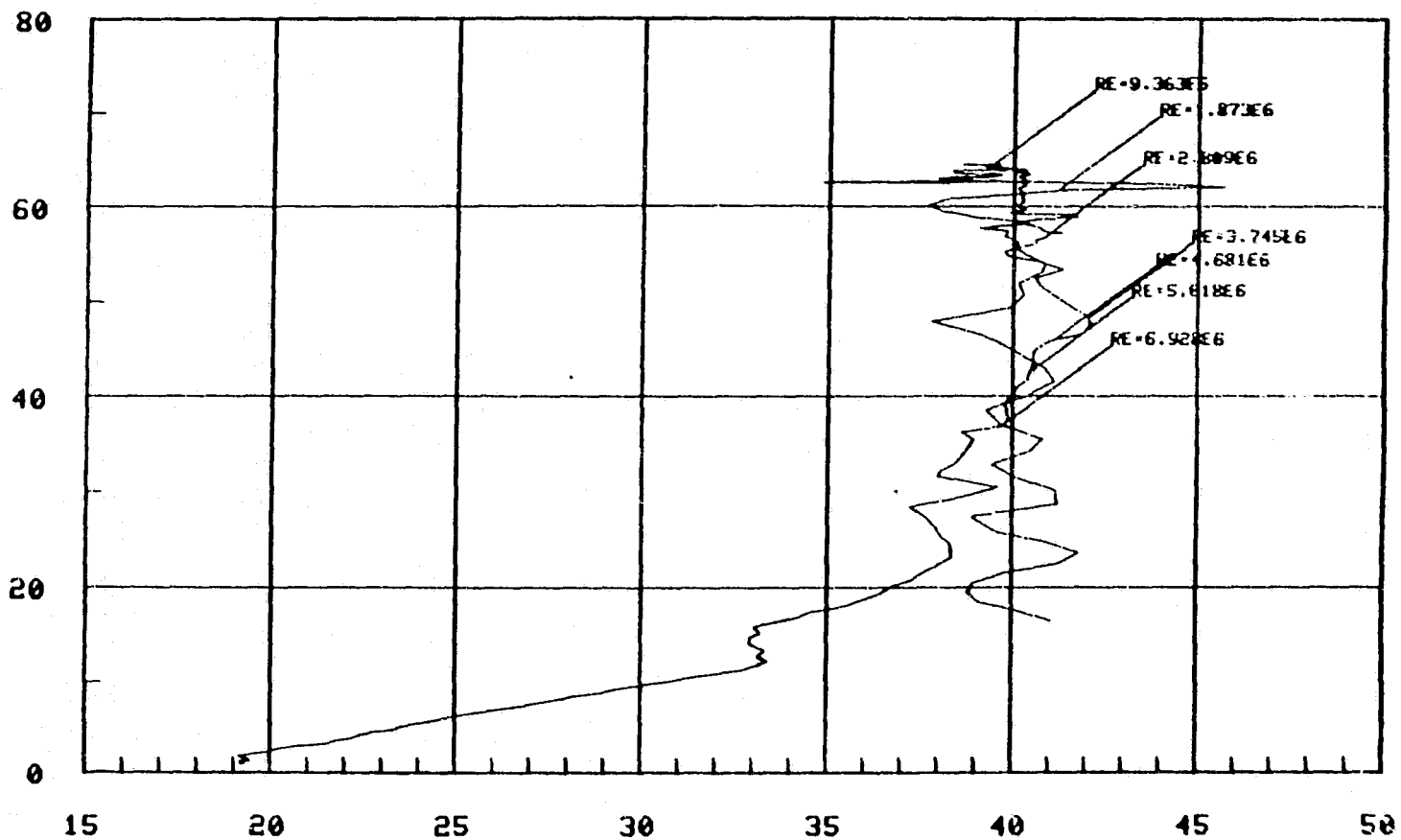
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STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

QREF

200-1480 SEC

HEADING RATE - BU/SEC



ANGLE-OF-ATTACK - DEG

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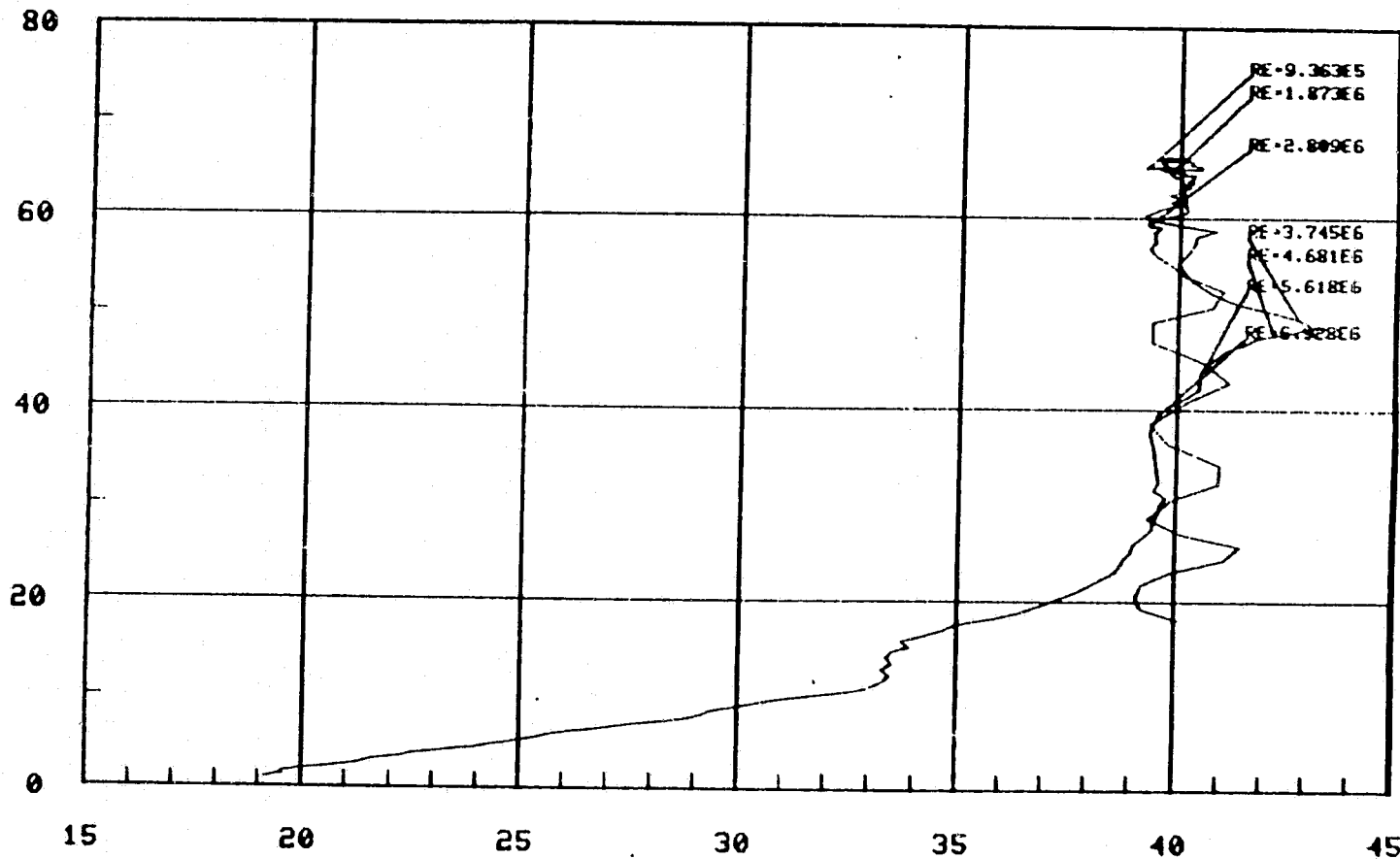
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QREF

200-1380 SEC

HEADING RATE - BLU/SEC - SEC



ANGLE-OF-ATTACK - DEG

05 03 S3
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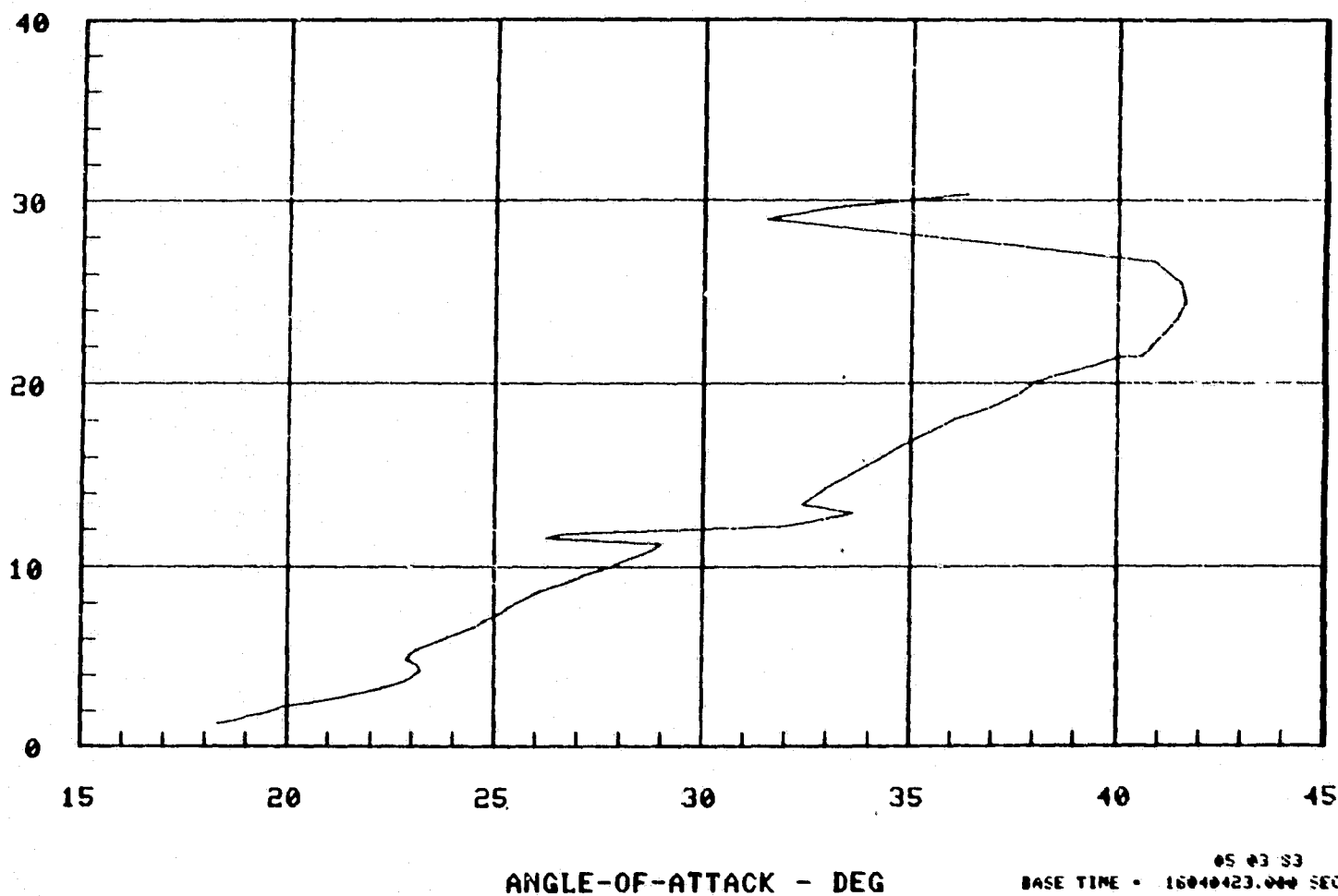
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FUELING REF - 100 LBS - 100 LBS

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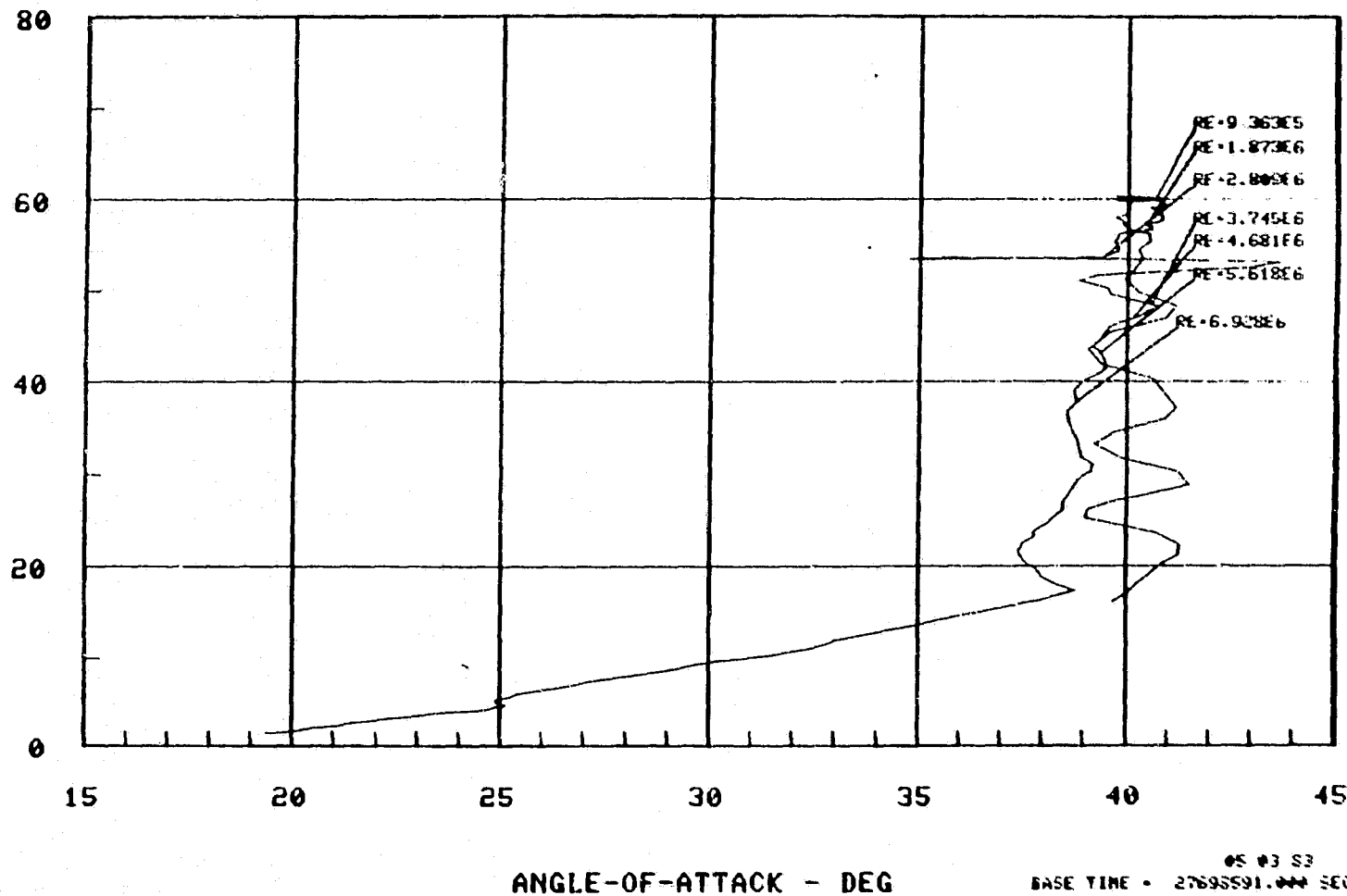
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150-1350 SEC

LOADING RATE - BLU/INCH - SEC

A-40



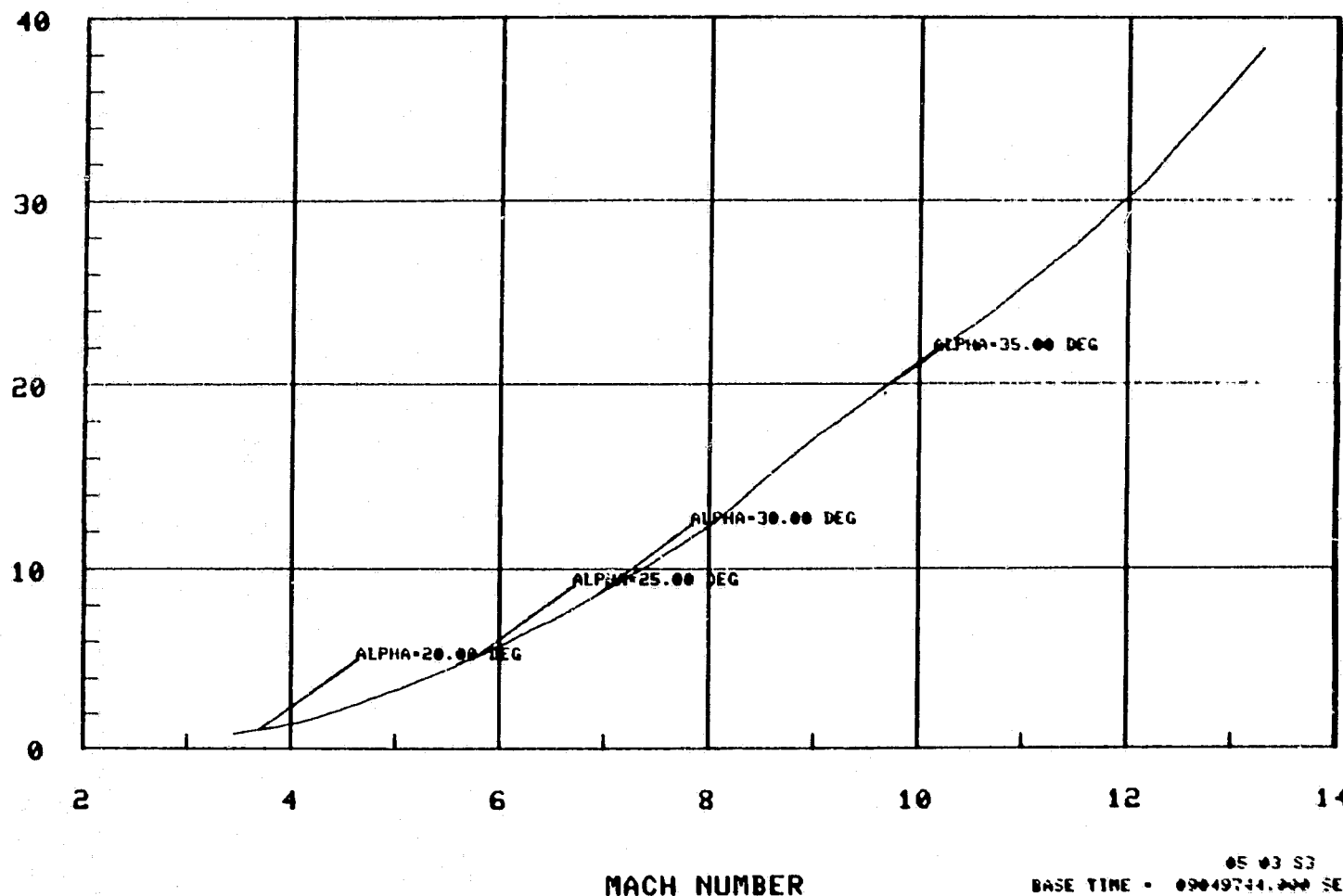
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TURNING RATE - BLU/SEC

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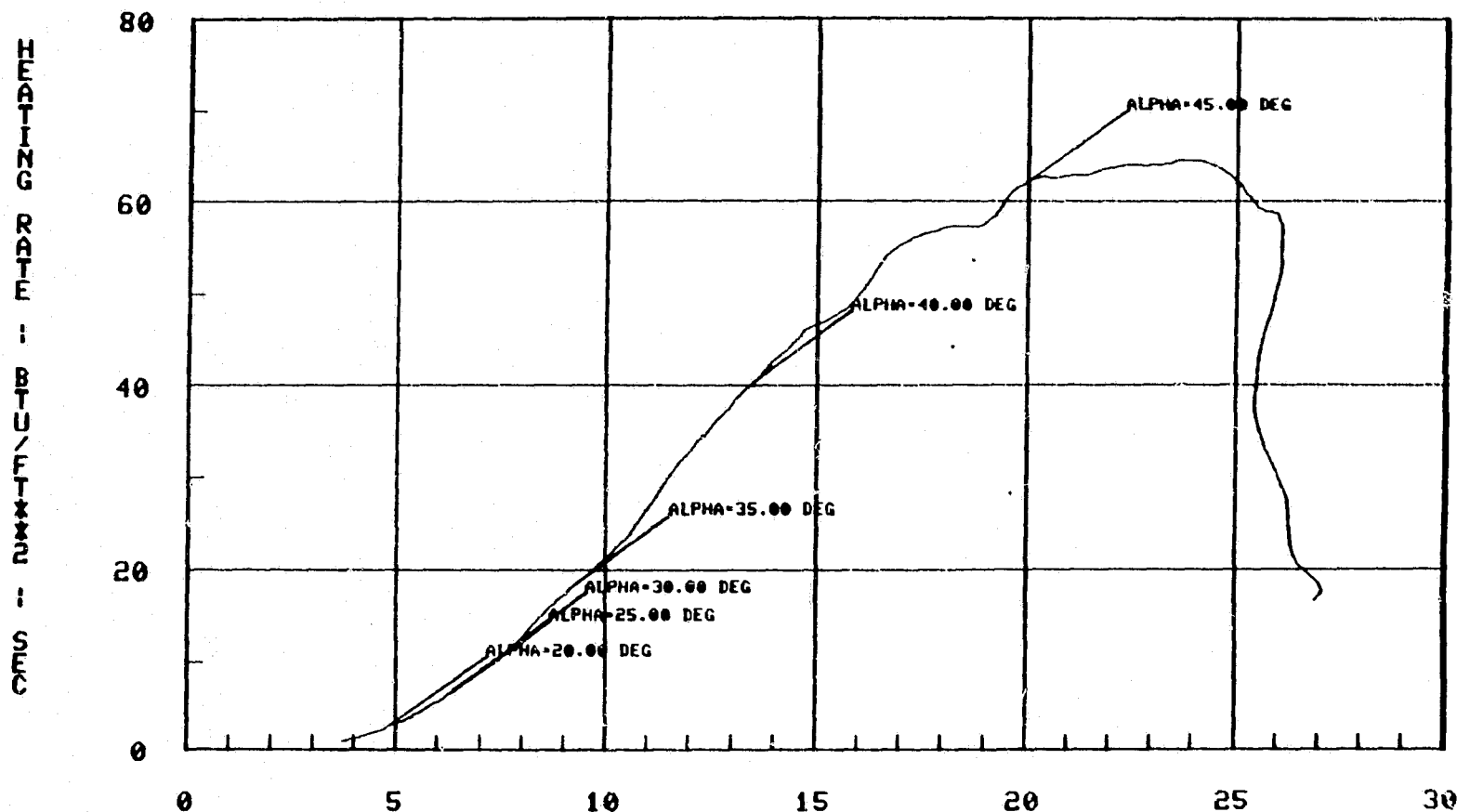


A-41

STS-2 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

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200-1480 SEC



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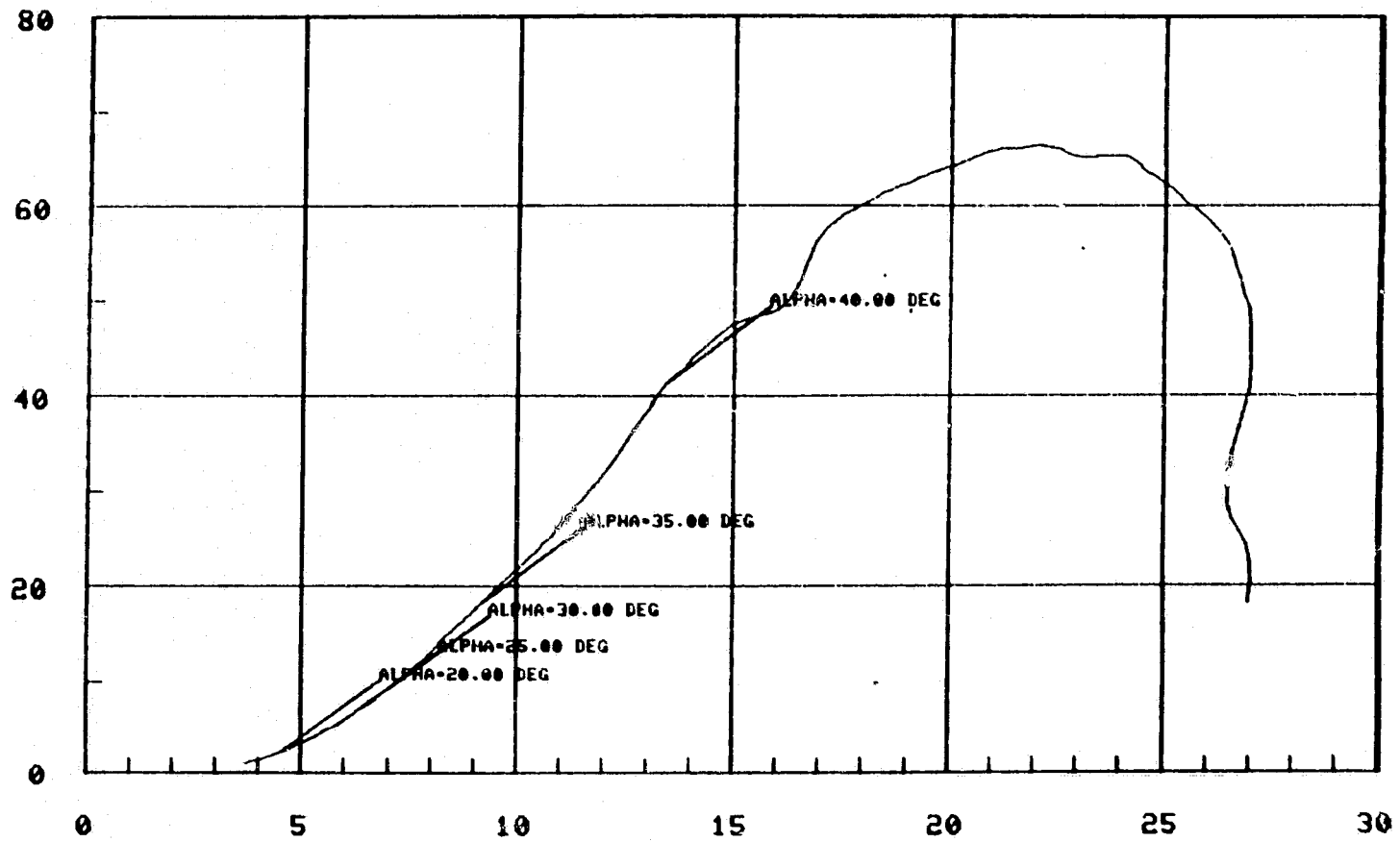
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200-1380 SEC

HEATING RATE - BULB - 1 SEC

A-43



MACH NUMBER

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05 03 83
07745684.000 SEC.

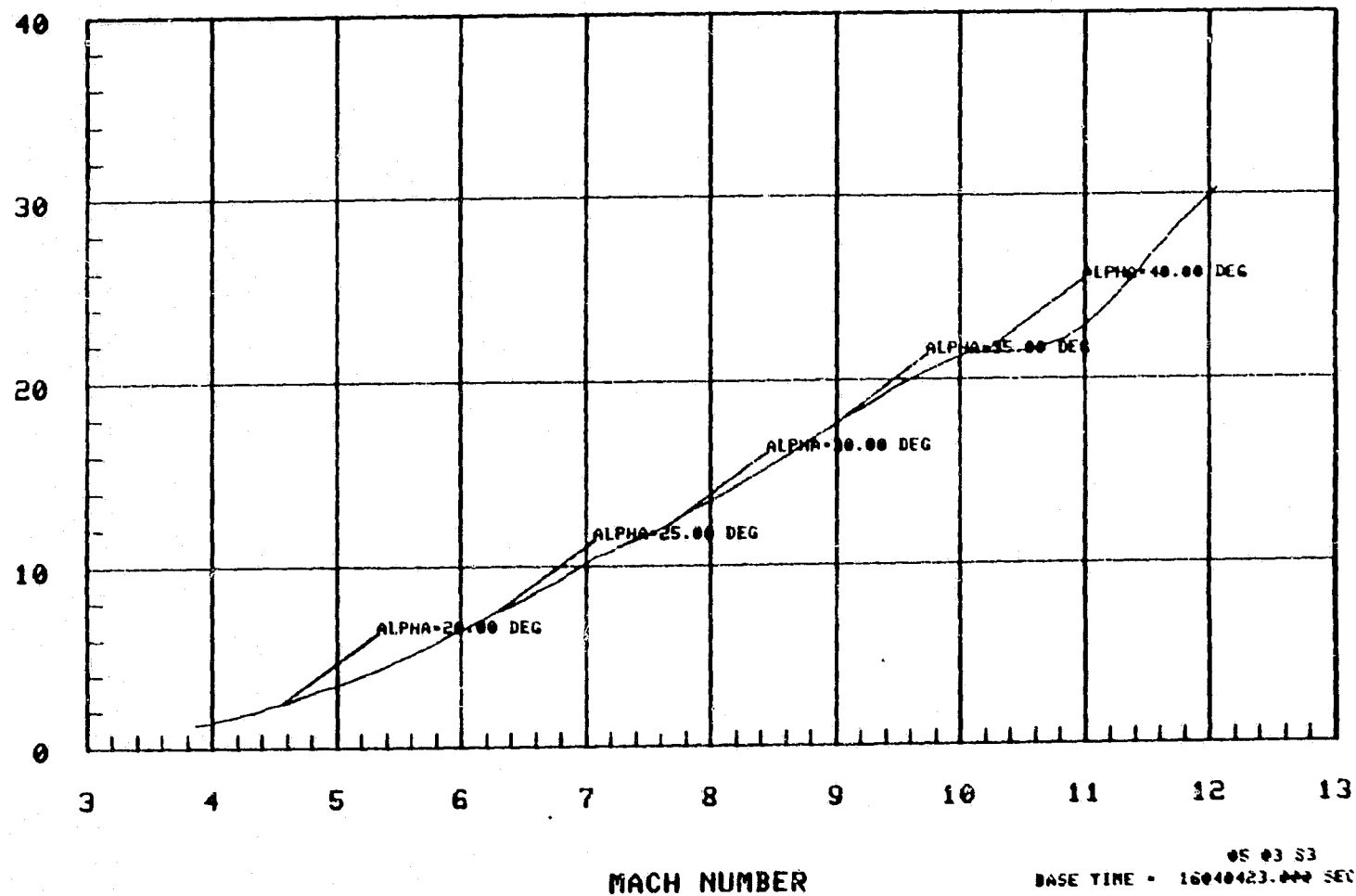
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965-1300 SEC

HEADING REF - BULLETING - SEC

A-44



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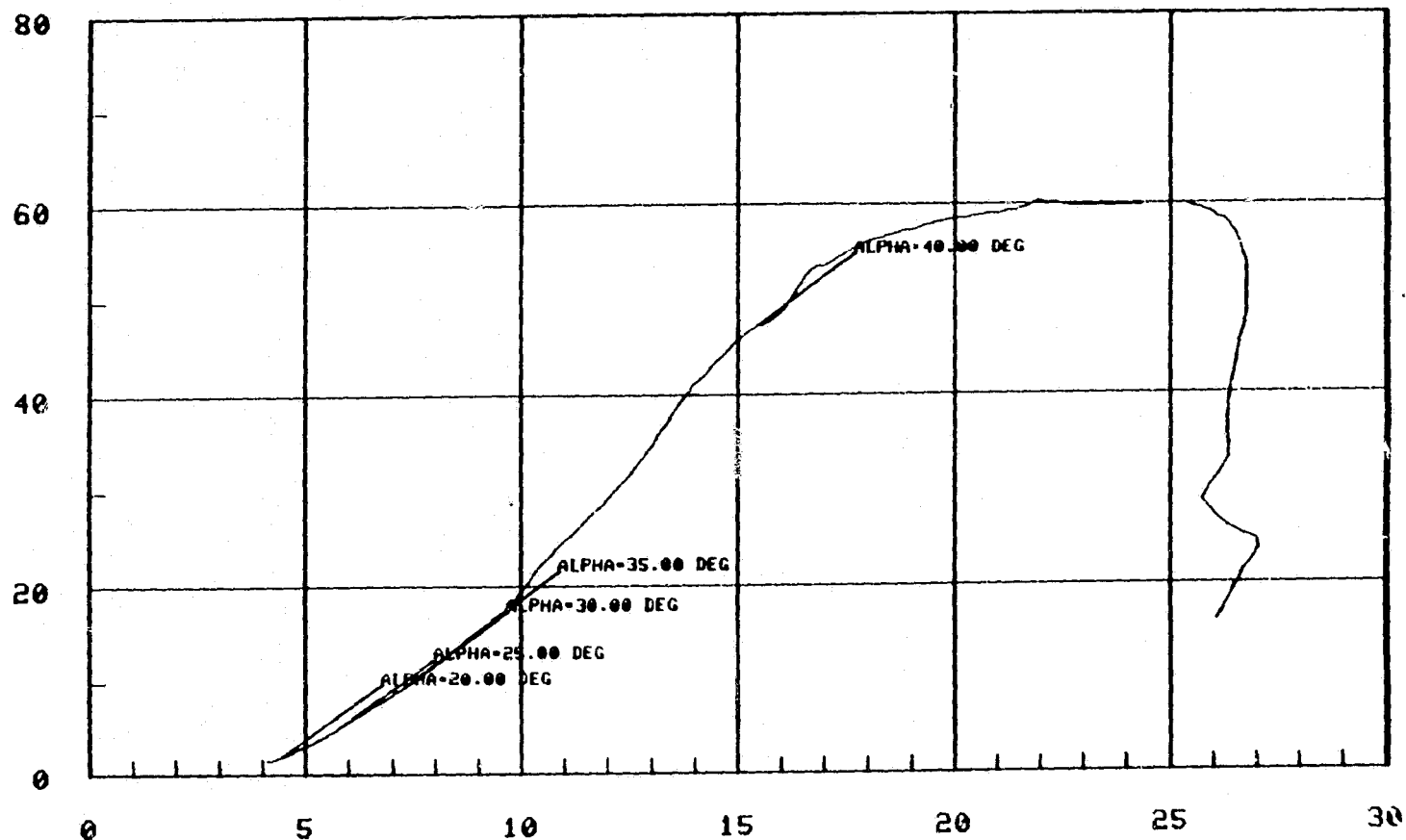
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150-1350 SEC

HEATING RATE - BOUNDARY - SMC

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MACH NUMBER

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BASE TIME = 27690591.000 SEC.

A-45

STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

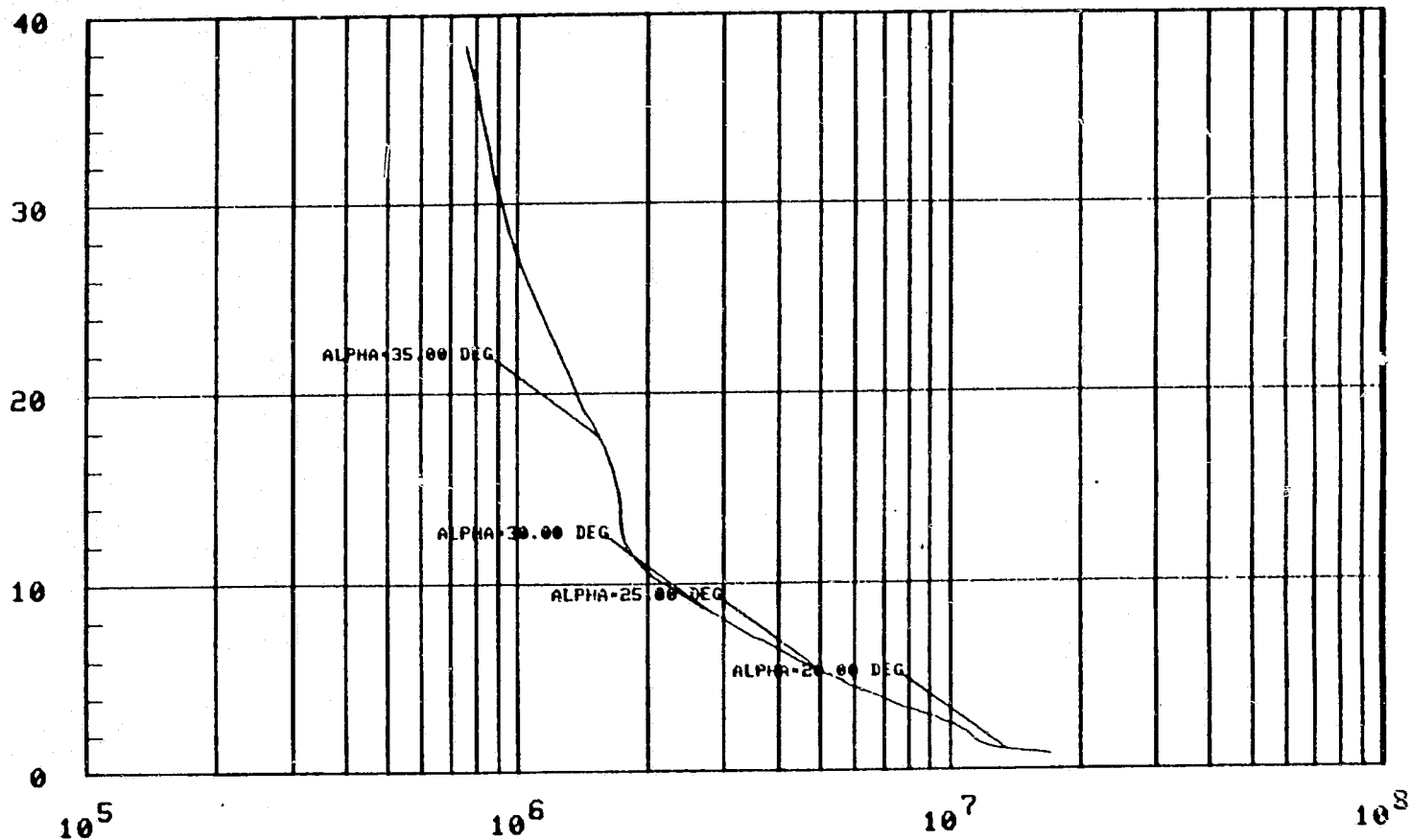
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1065-1460 SEC

HEATING RATE - BULB/FT-SEC

A-46

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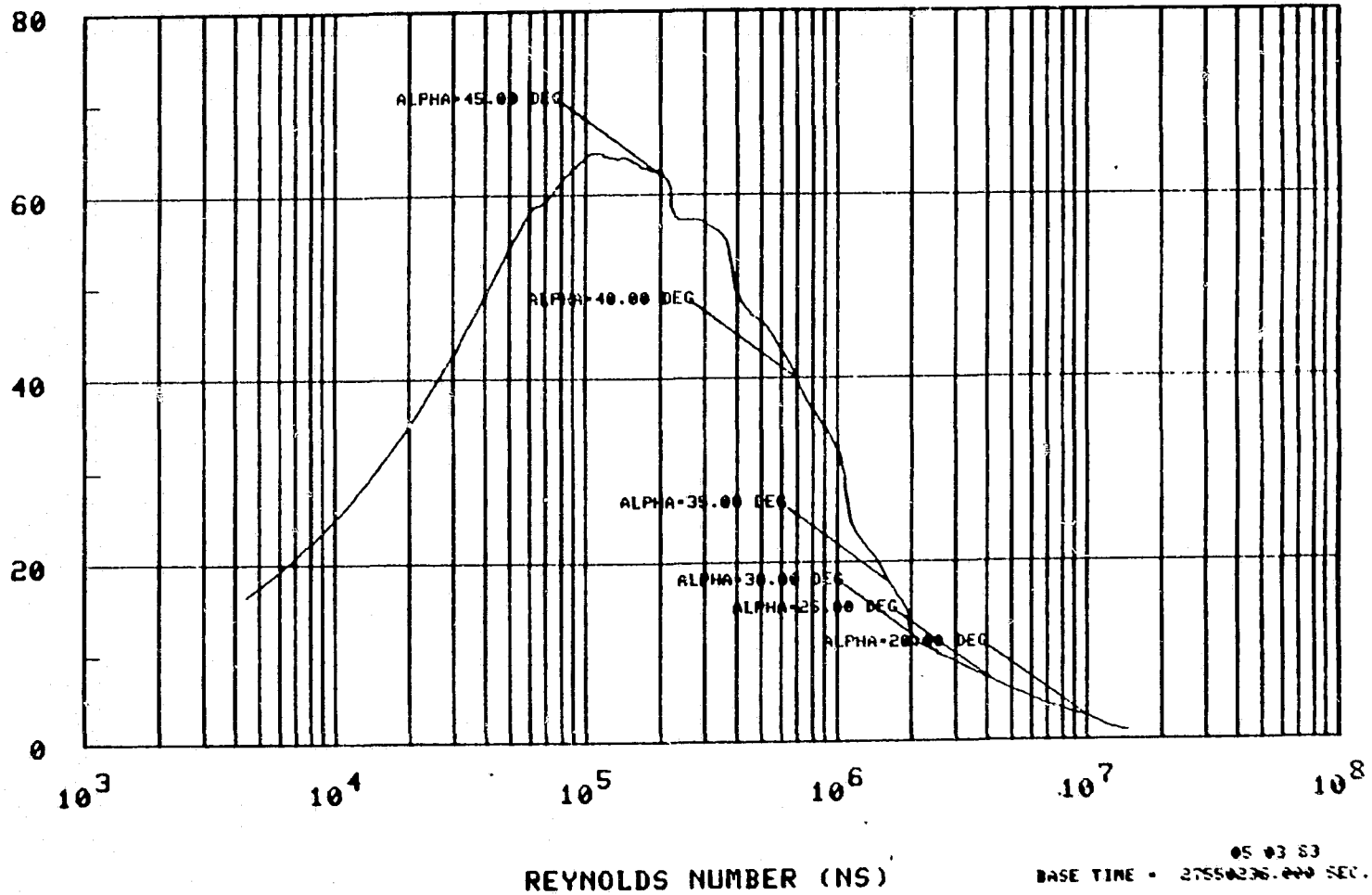
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200-1480 SEC

INTEGRATING RATE - BLU/LEMMING - GWC

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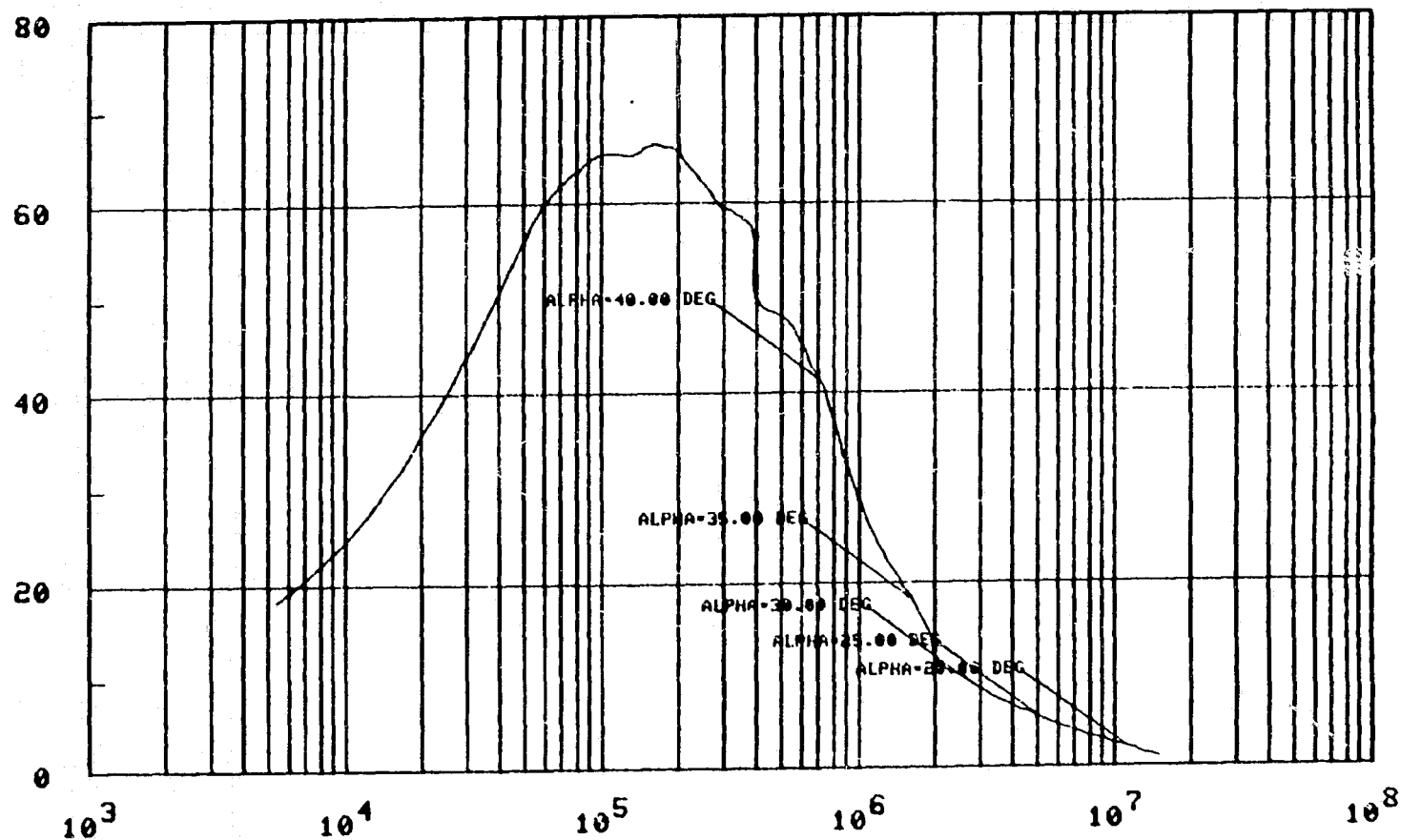


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QREF

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HEATING RATE - BTU/FT² - SEC



REYNOLDS NUMBER (NS)

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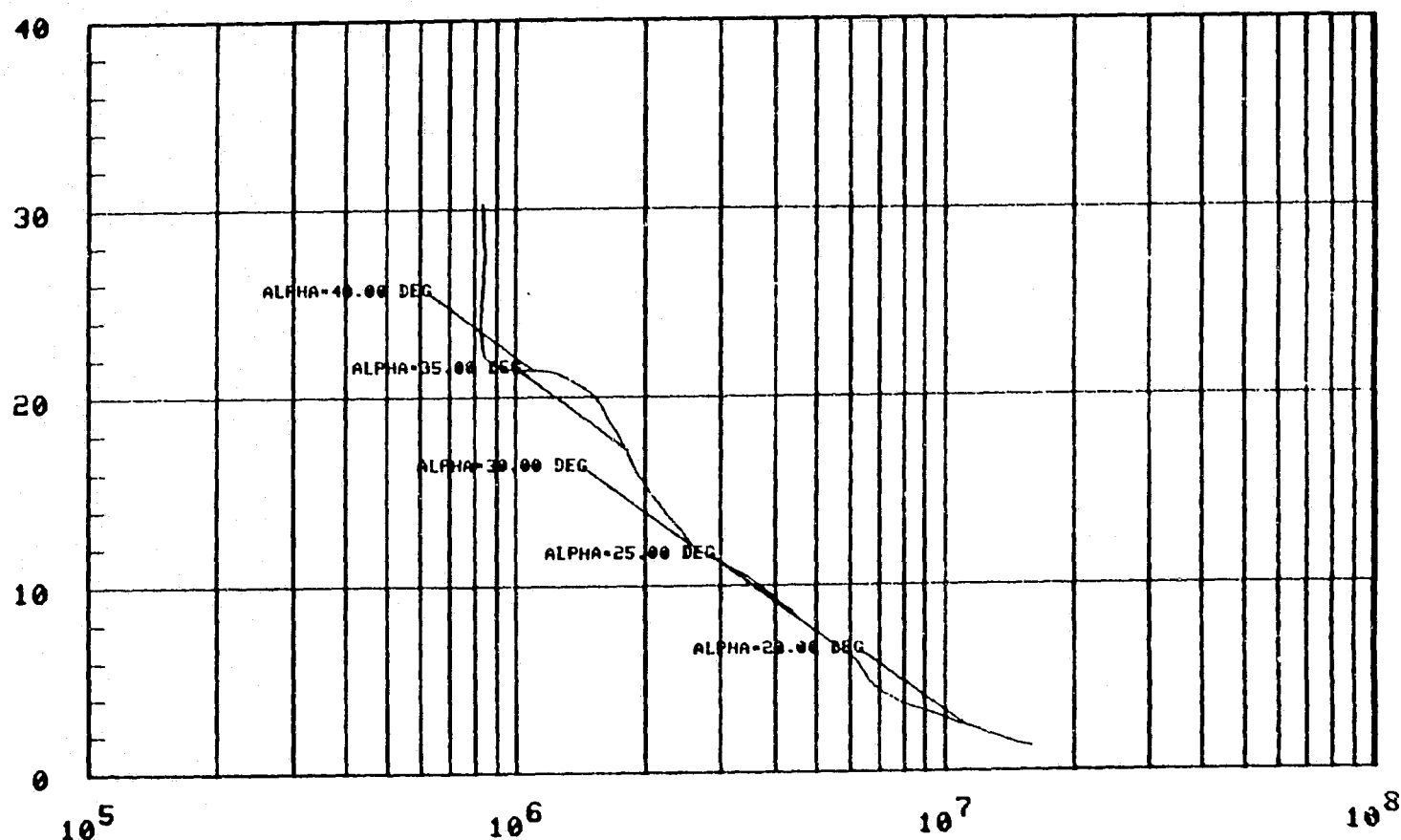
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A-49

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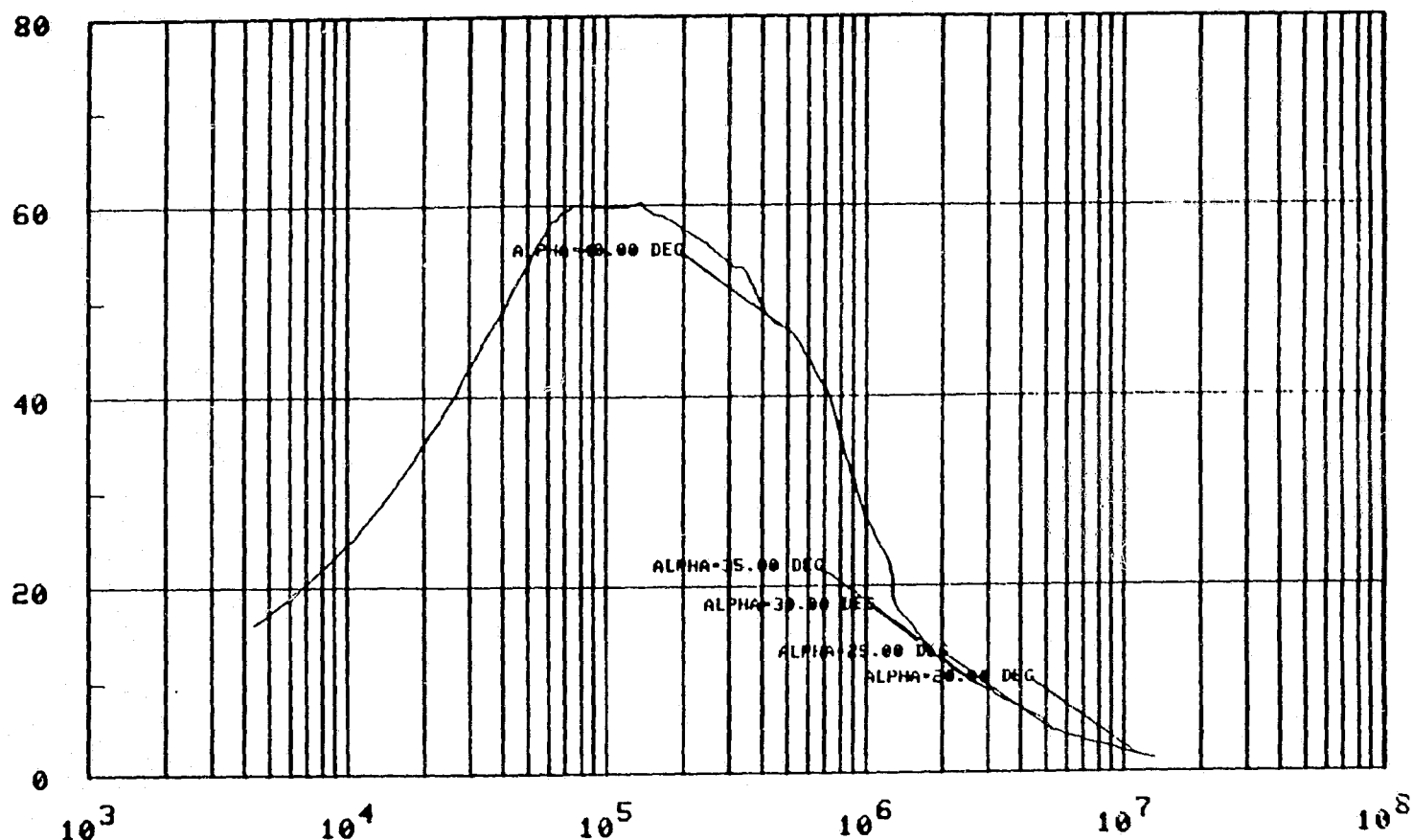
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150-1350 SEC

HEATING RATE - BURNING - SEC

A-50



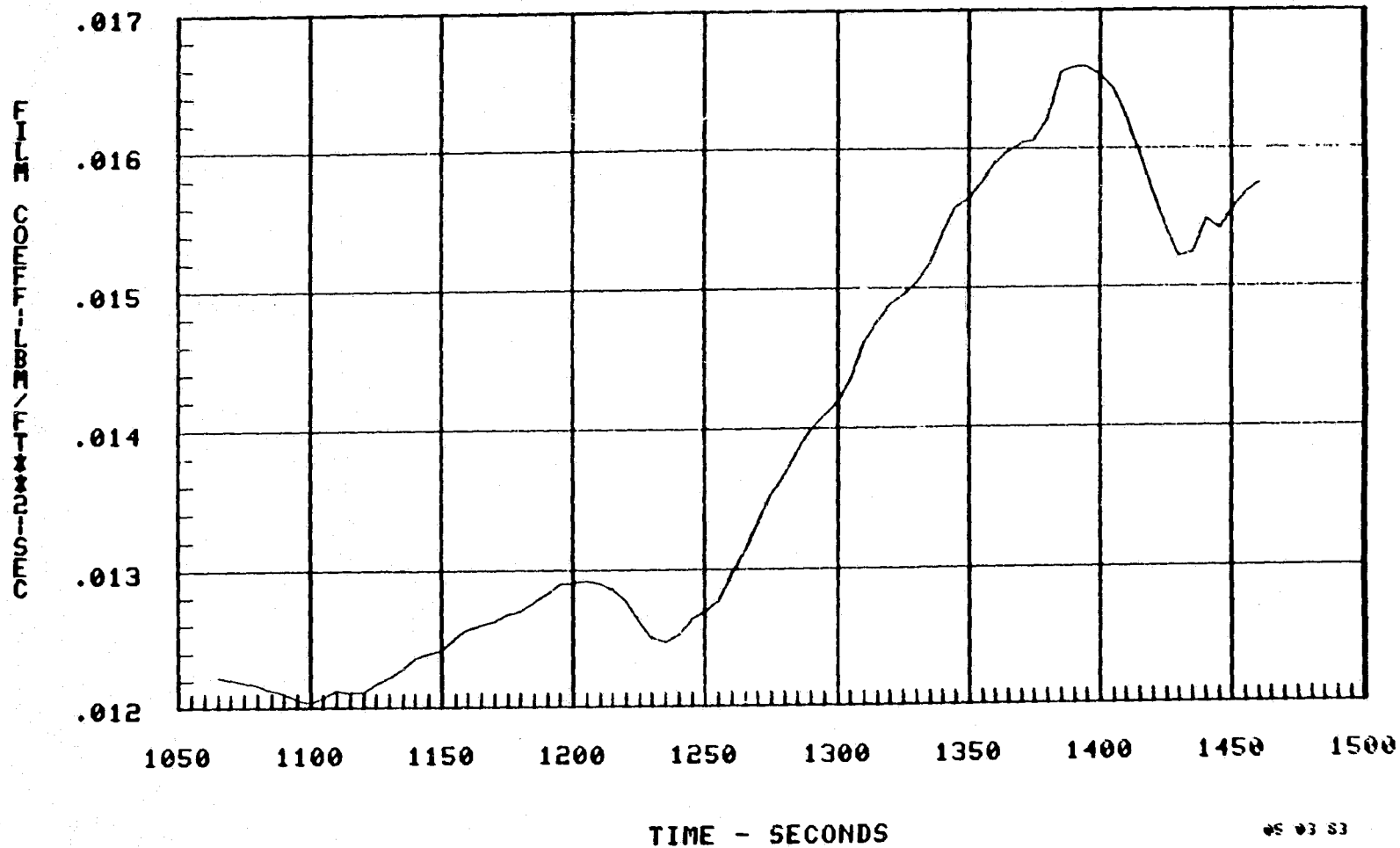
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STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

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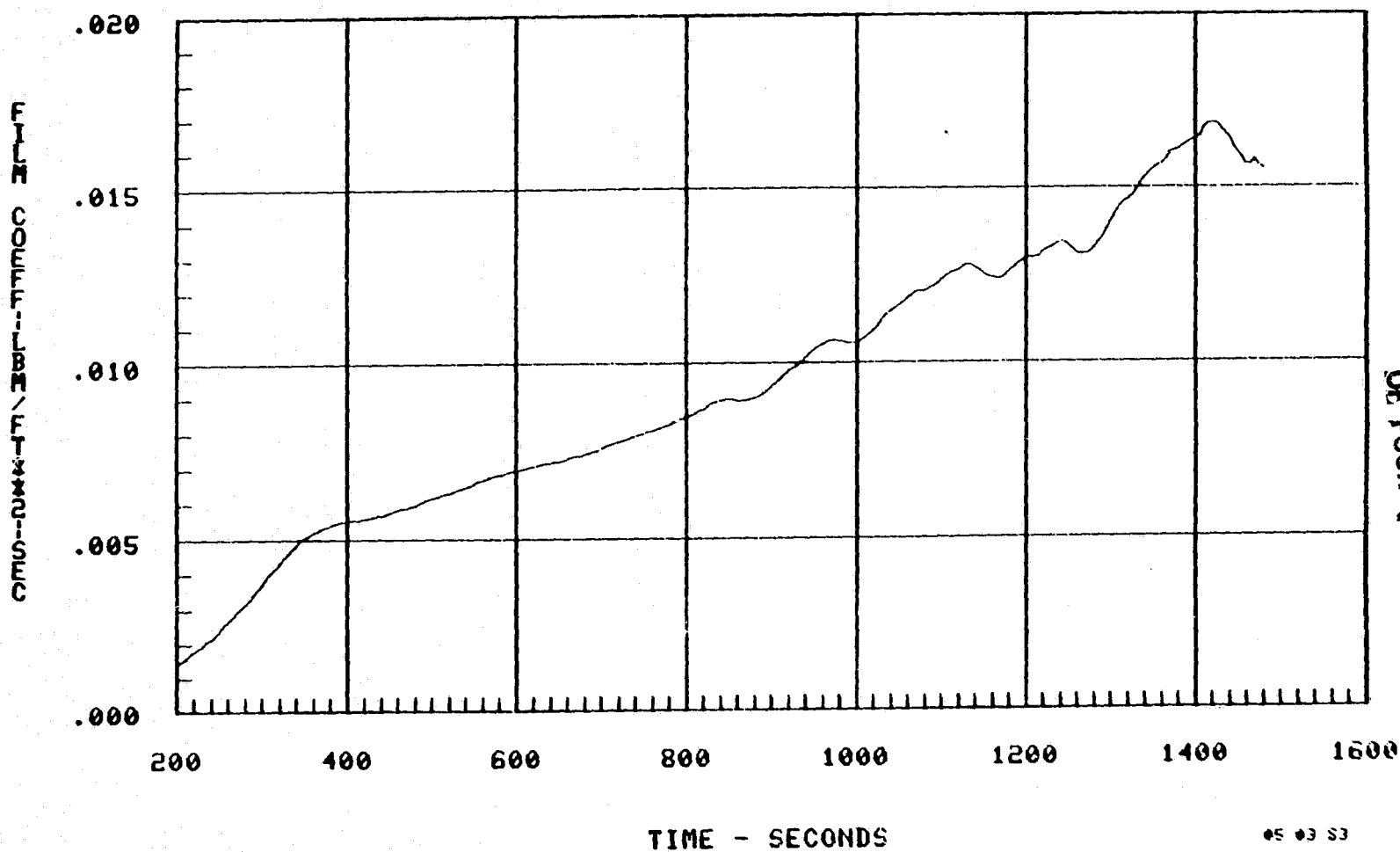
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A-51

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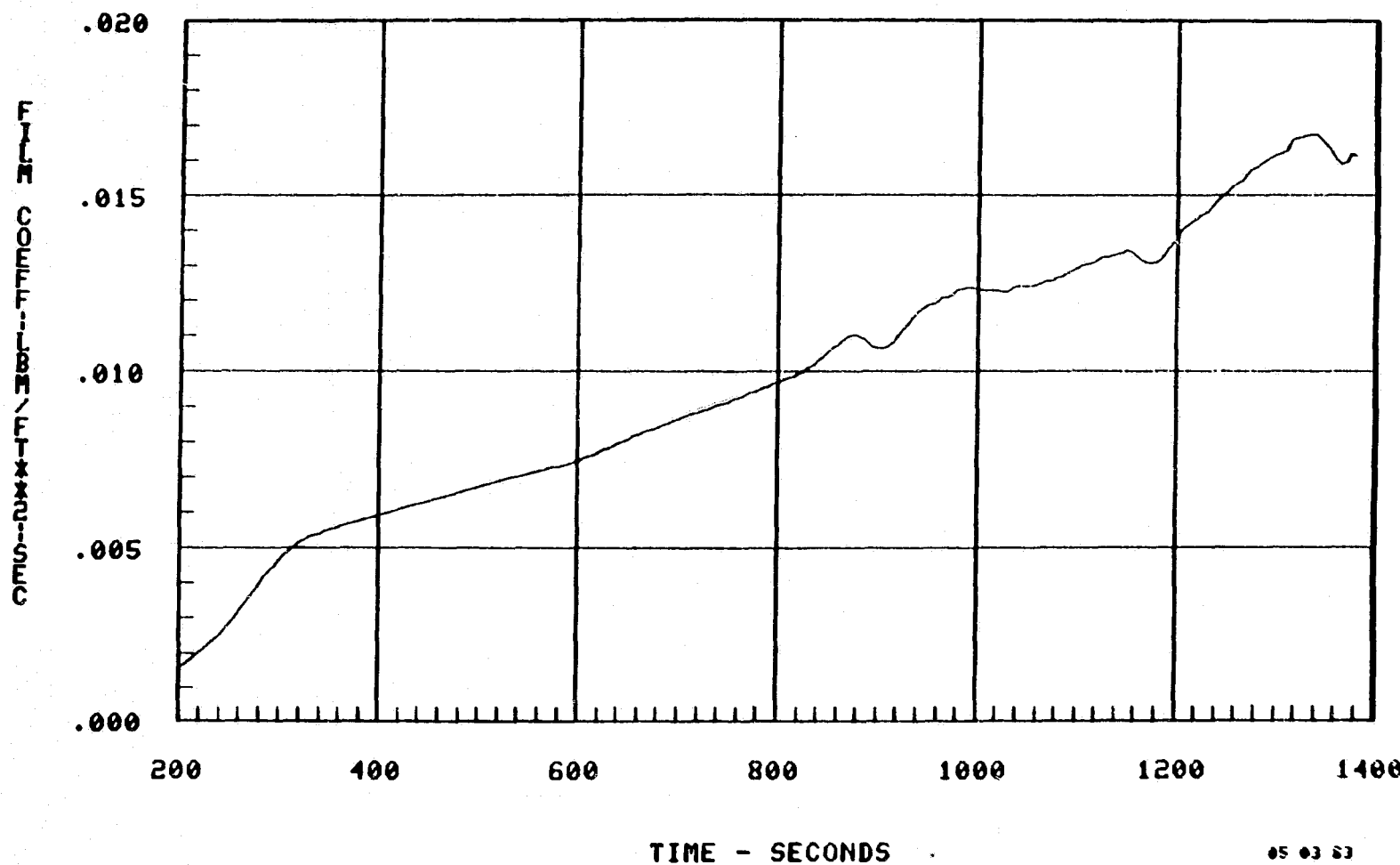
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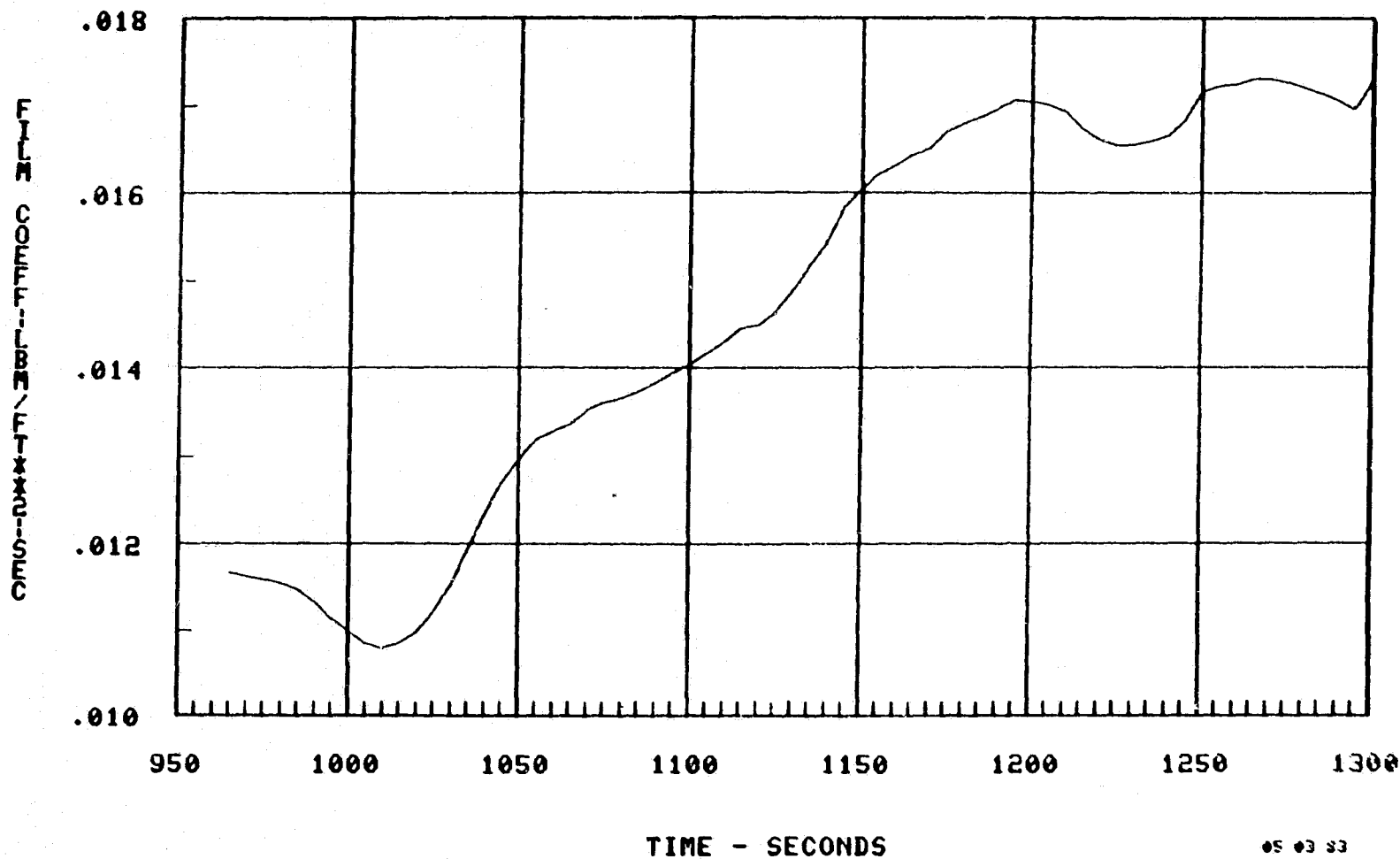
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A-53

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STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

— HREF



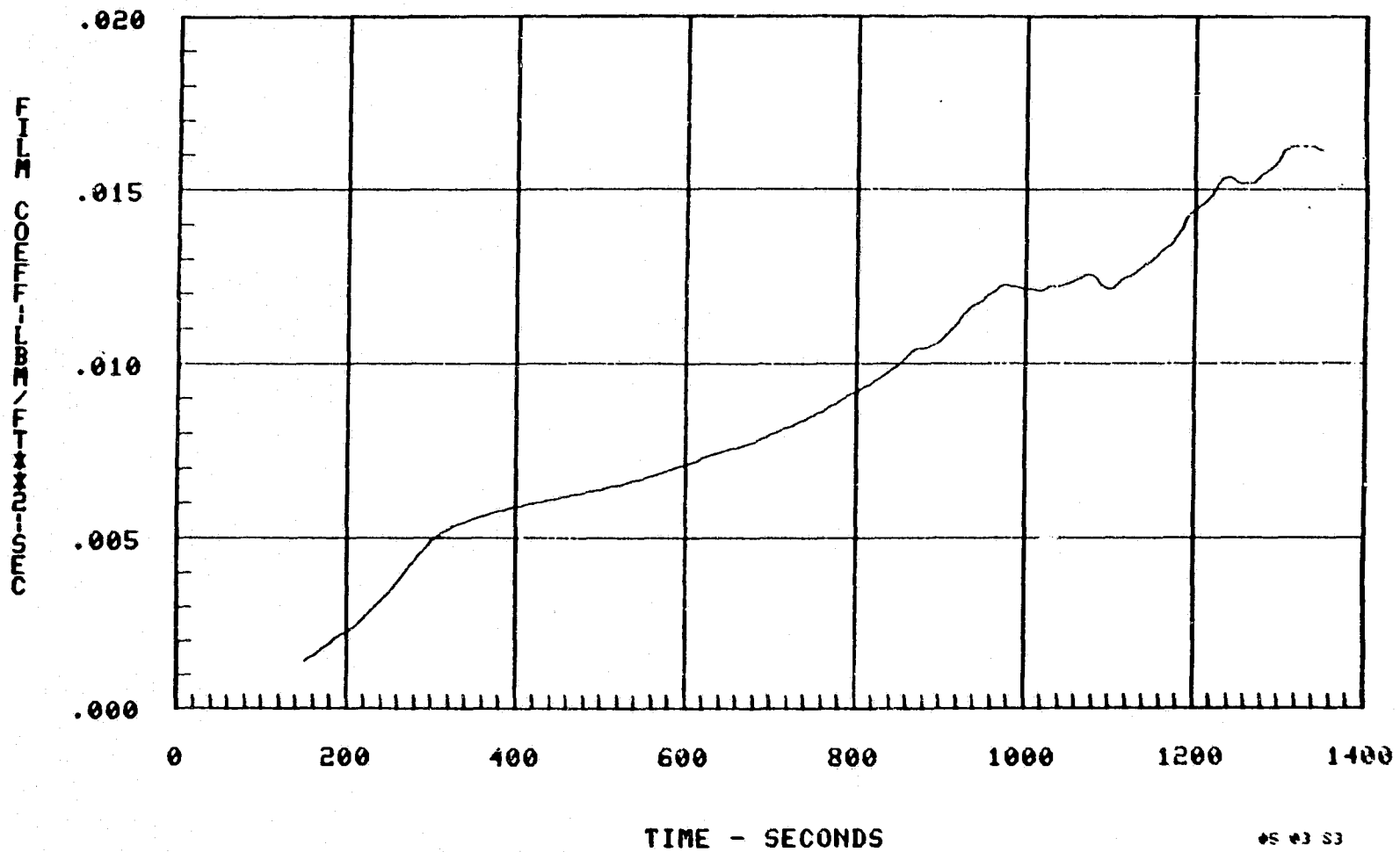
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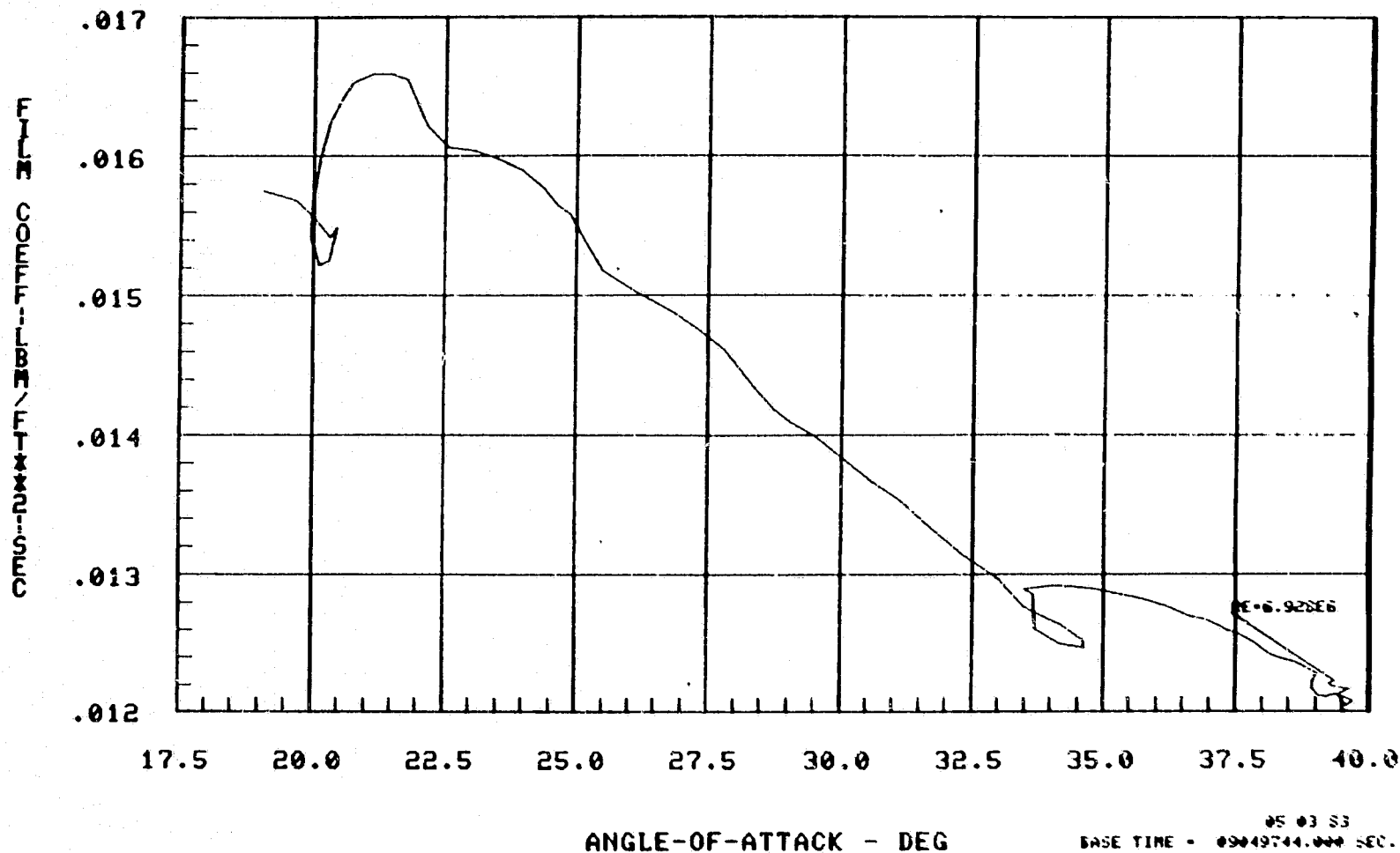


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HREF

1065-1460 SEC



A-56

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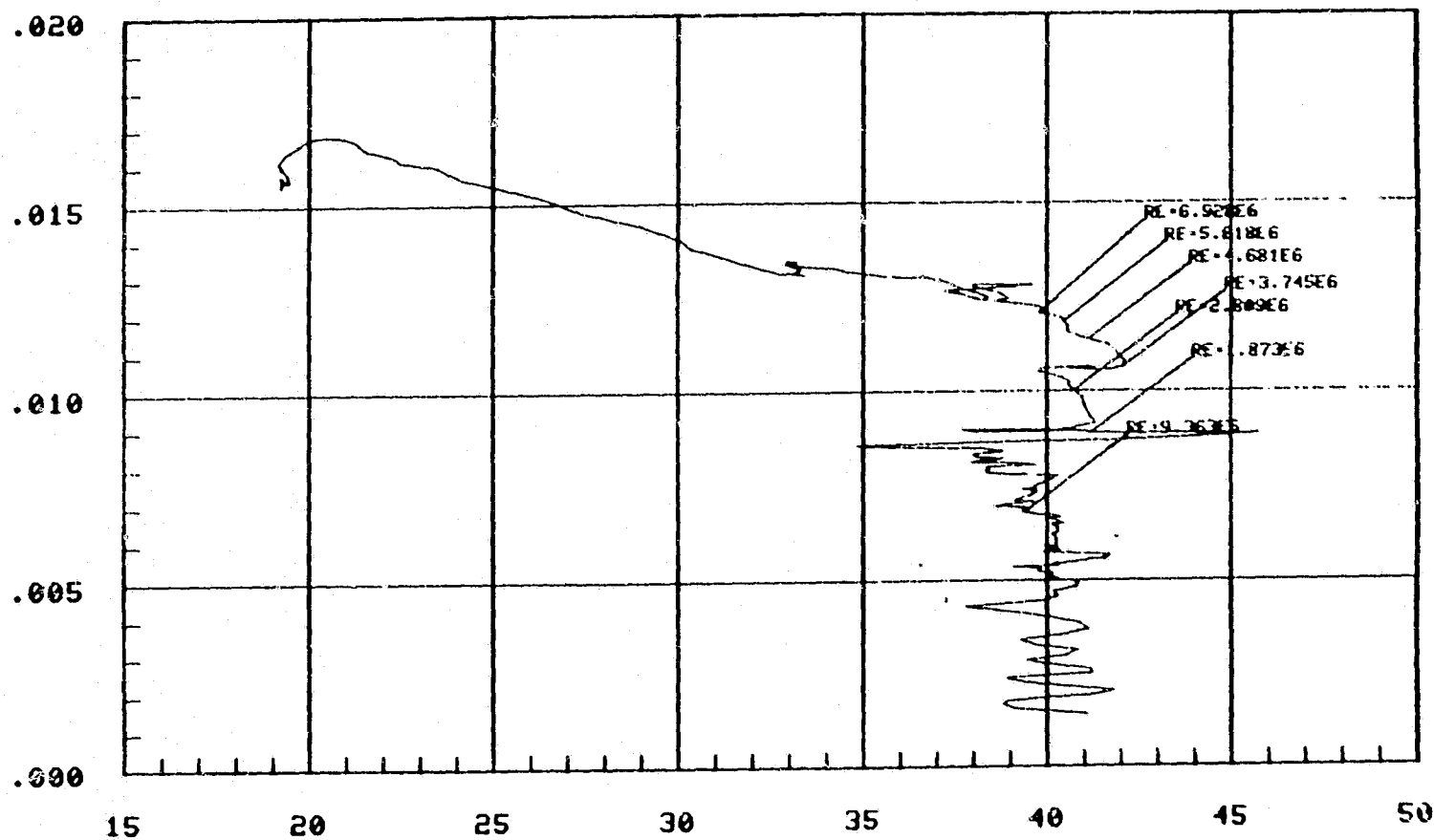
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HREF

200-1480 SEC

LINE COLLISION-LEADING-EDGE



ANGLE-OF-ATTACK - DEG

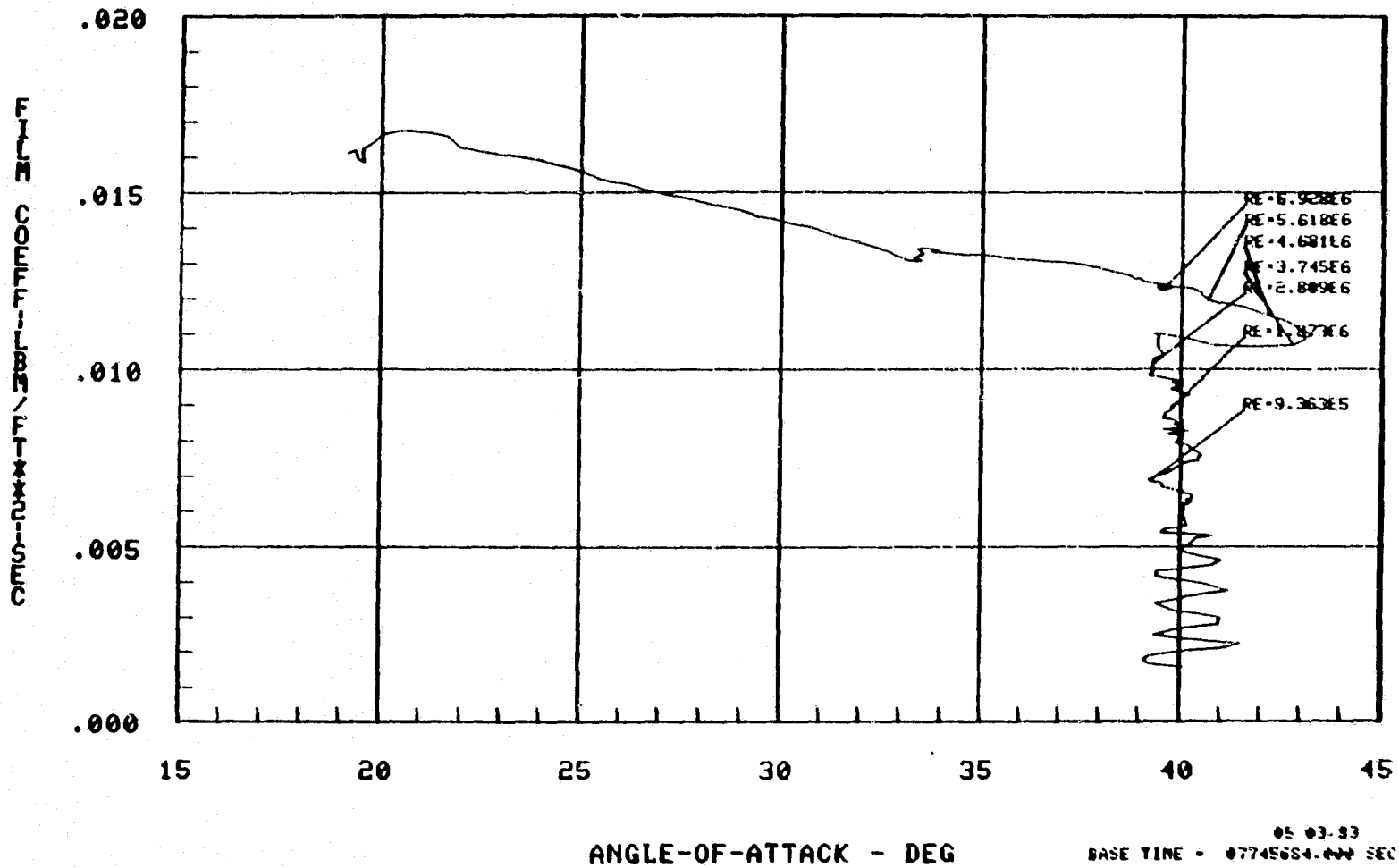
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STS-3 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

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200-1380 SEC

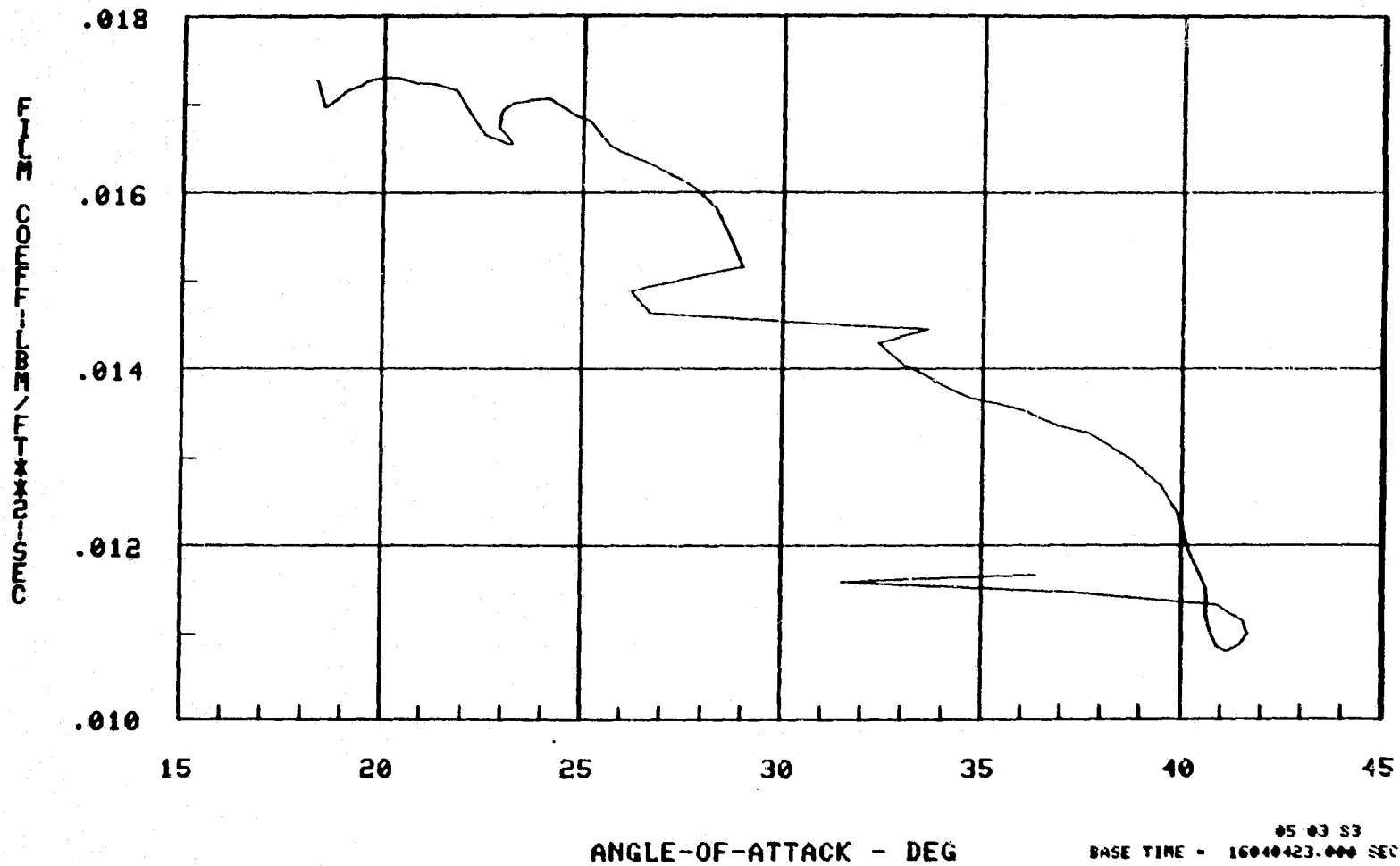


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STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

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965-1300 SEC



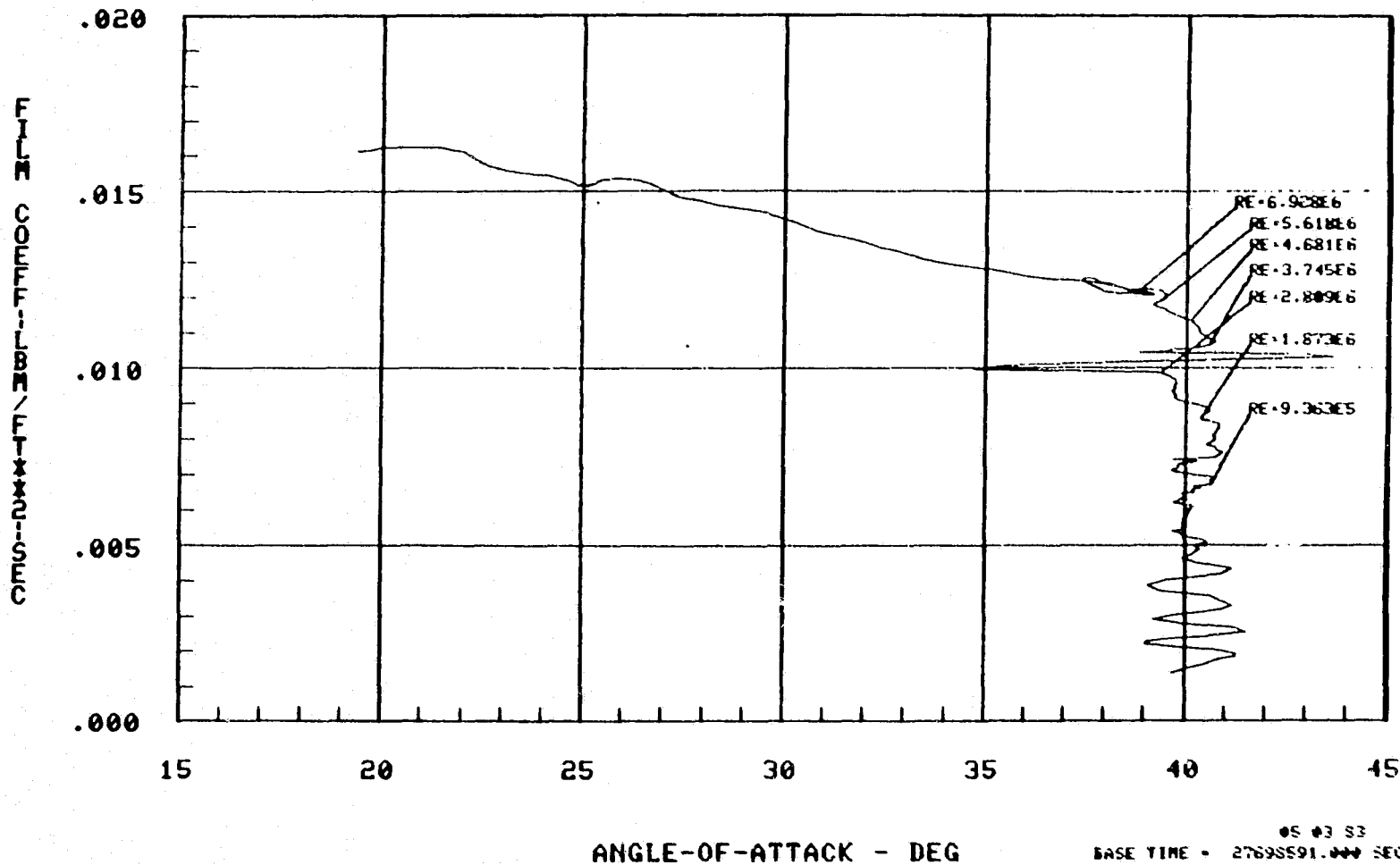
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A-59

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HREF

150-1350 SEC



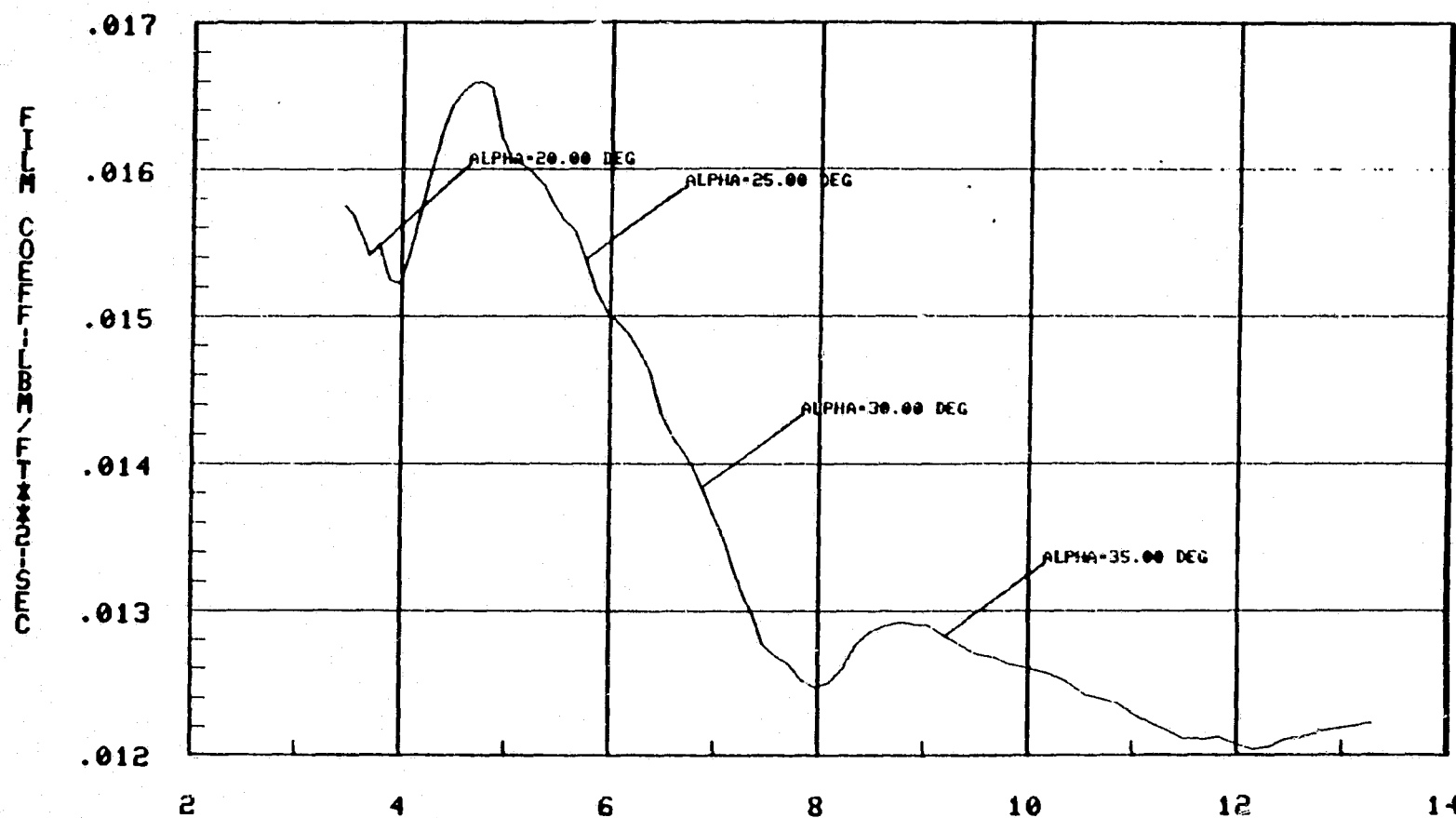
A-60

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STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

— HREF

1065-1460 SEC



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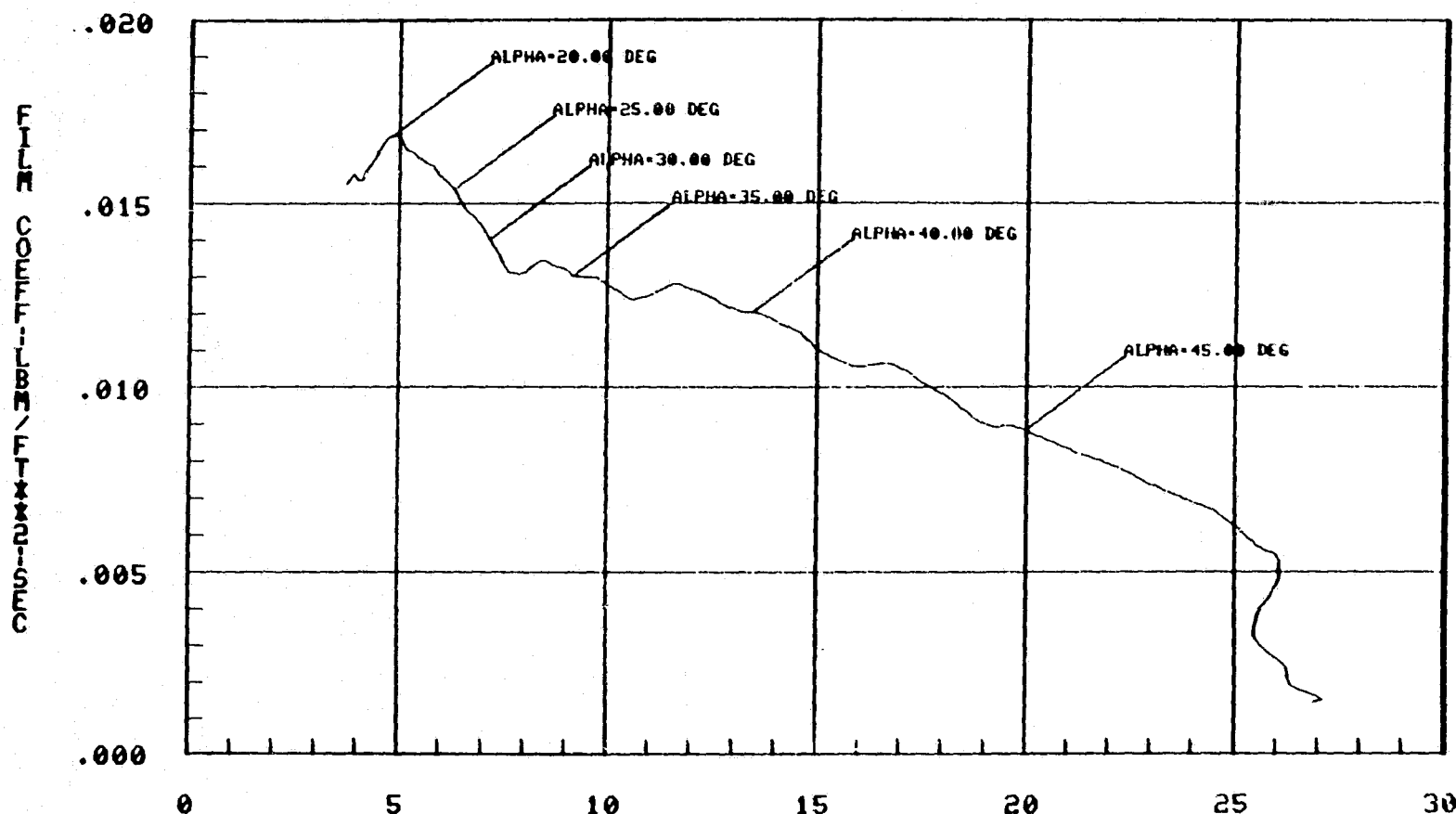
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200-1480 SEC



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A-62

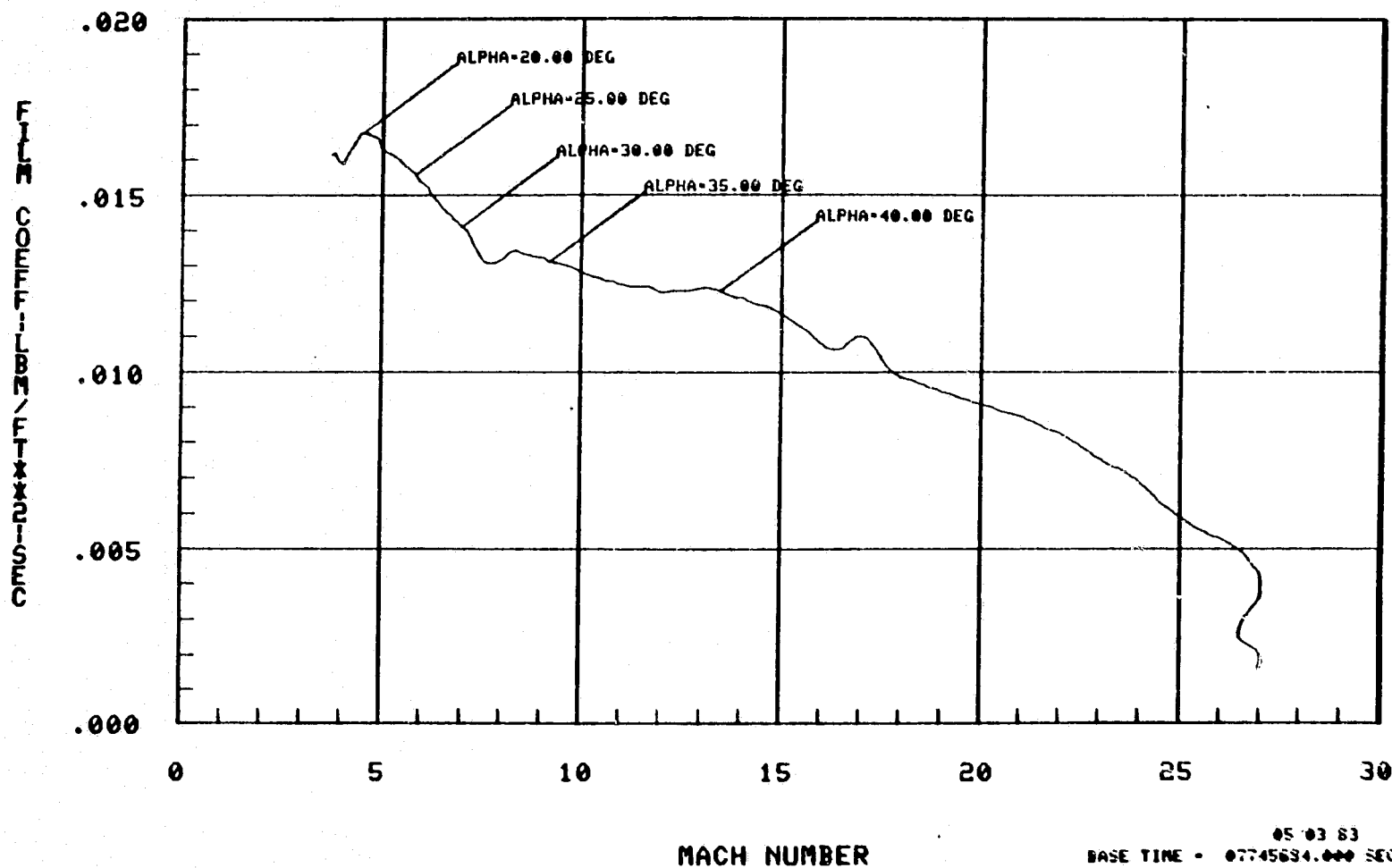
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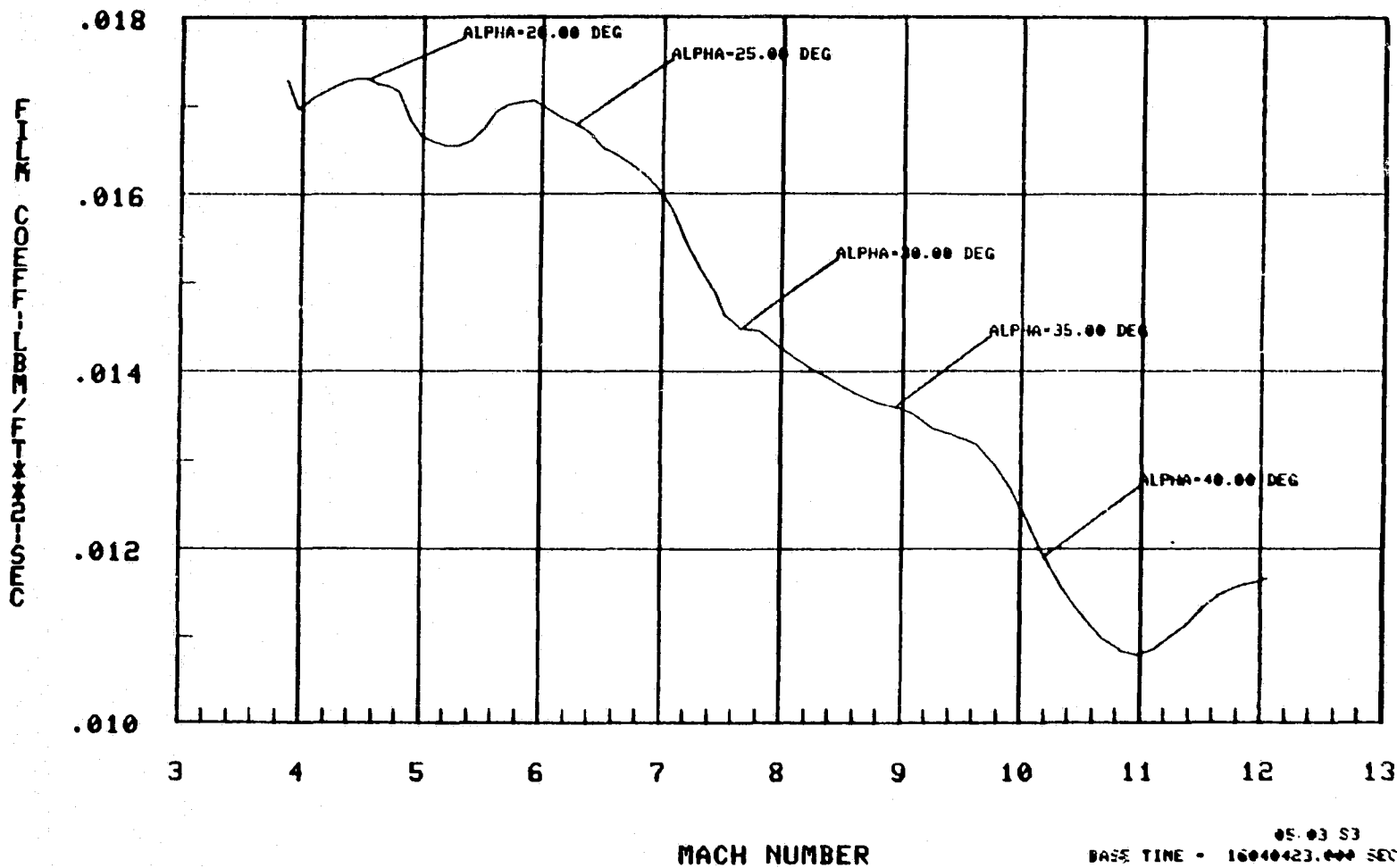
A-63

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LIBRARY

STS-4 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

HREF

965-1300 SEC



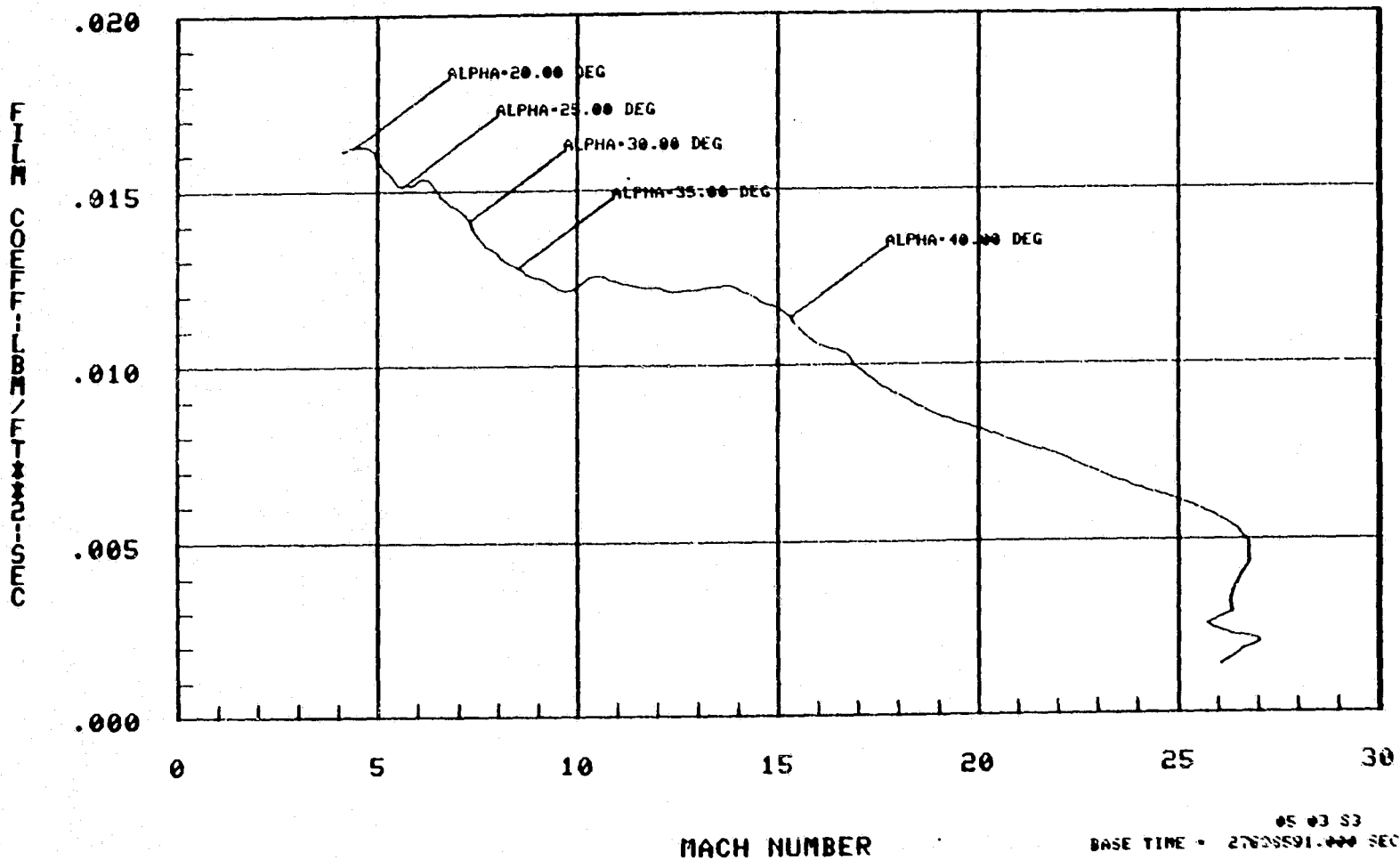
A-64

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STS-5 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

HREF

150-1350 SEC



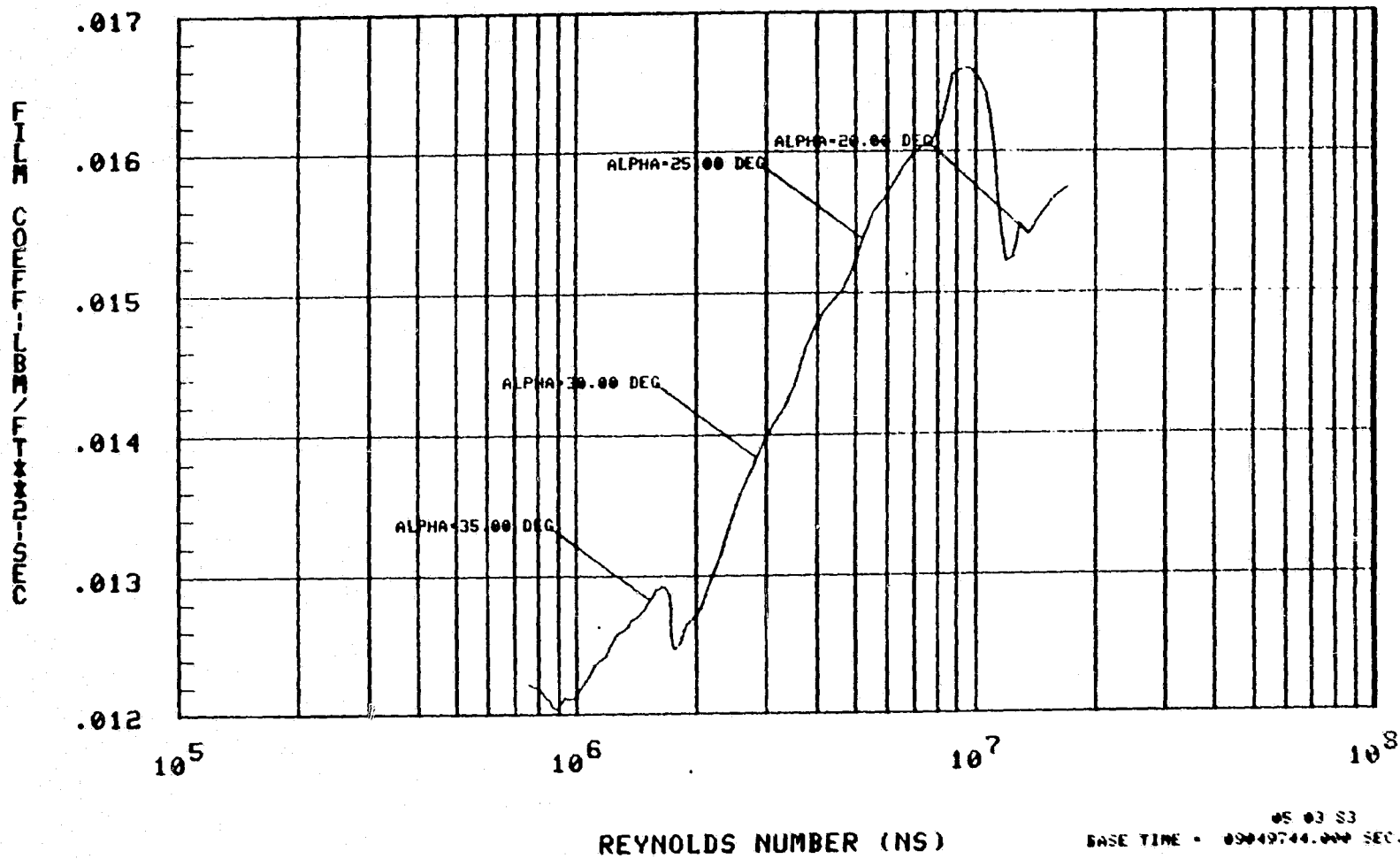
A-55

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OF THE

STS-1 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

HREF

1065-1460 SEC



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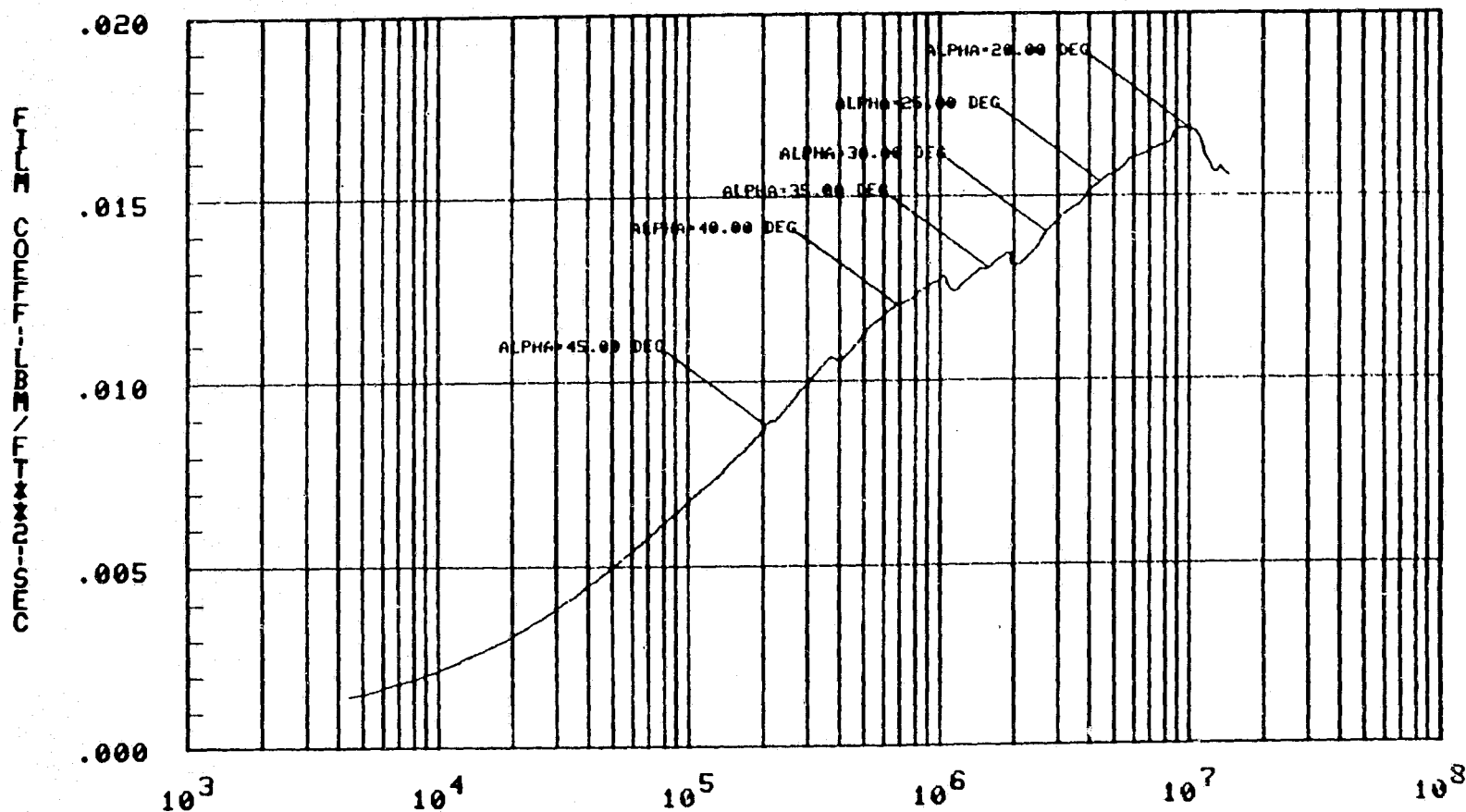
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FILED --- COFFEE --- LIT --- 2 --- SEC

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HREF

200-1480 SEC



A-67

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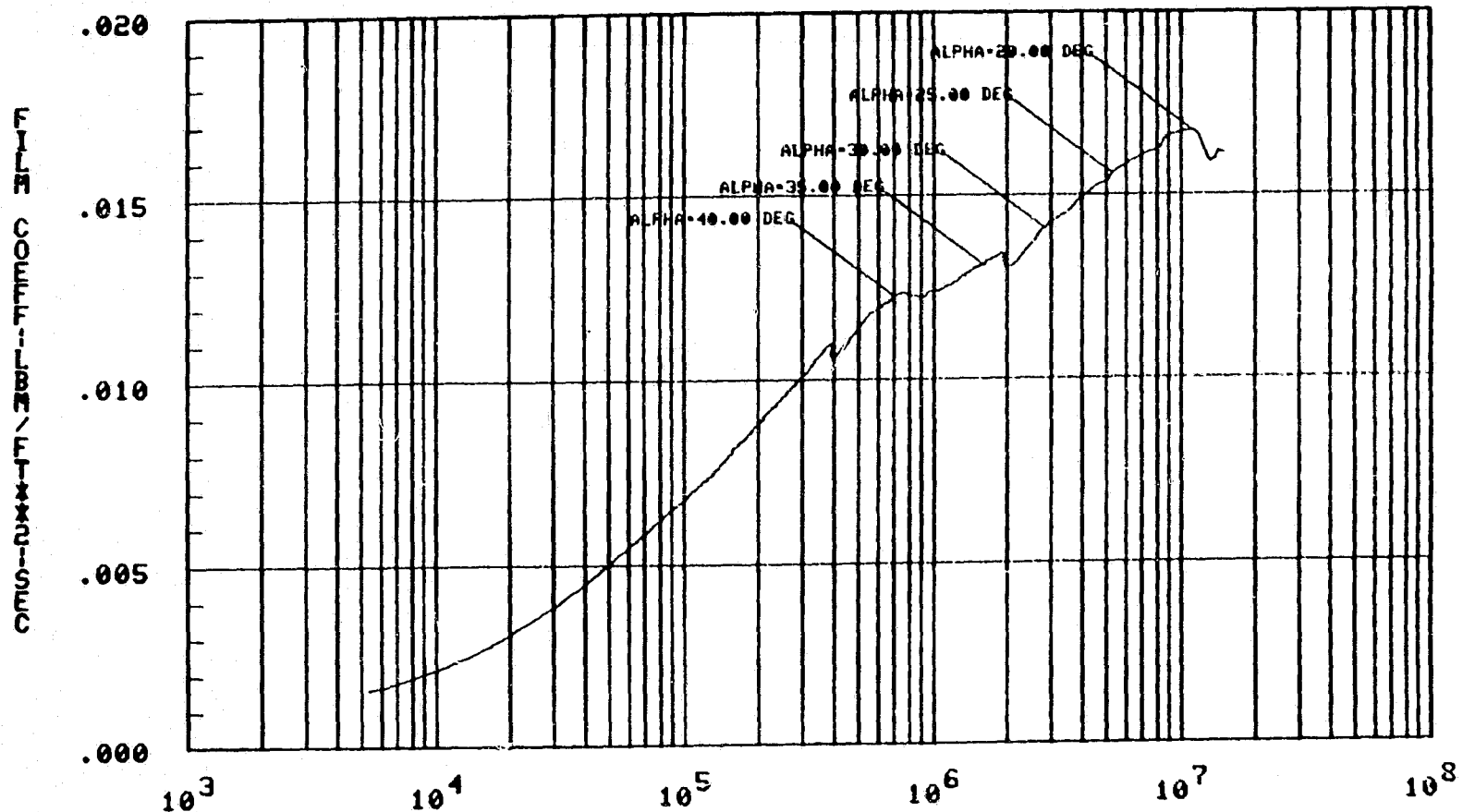
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200-1380 SEC



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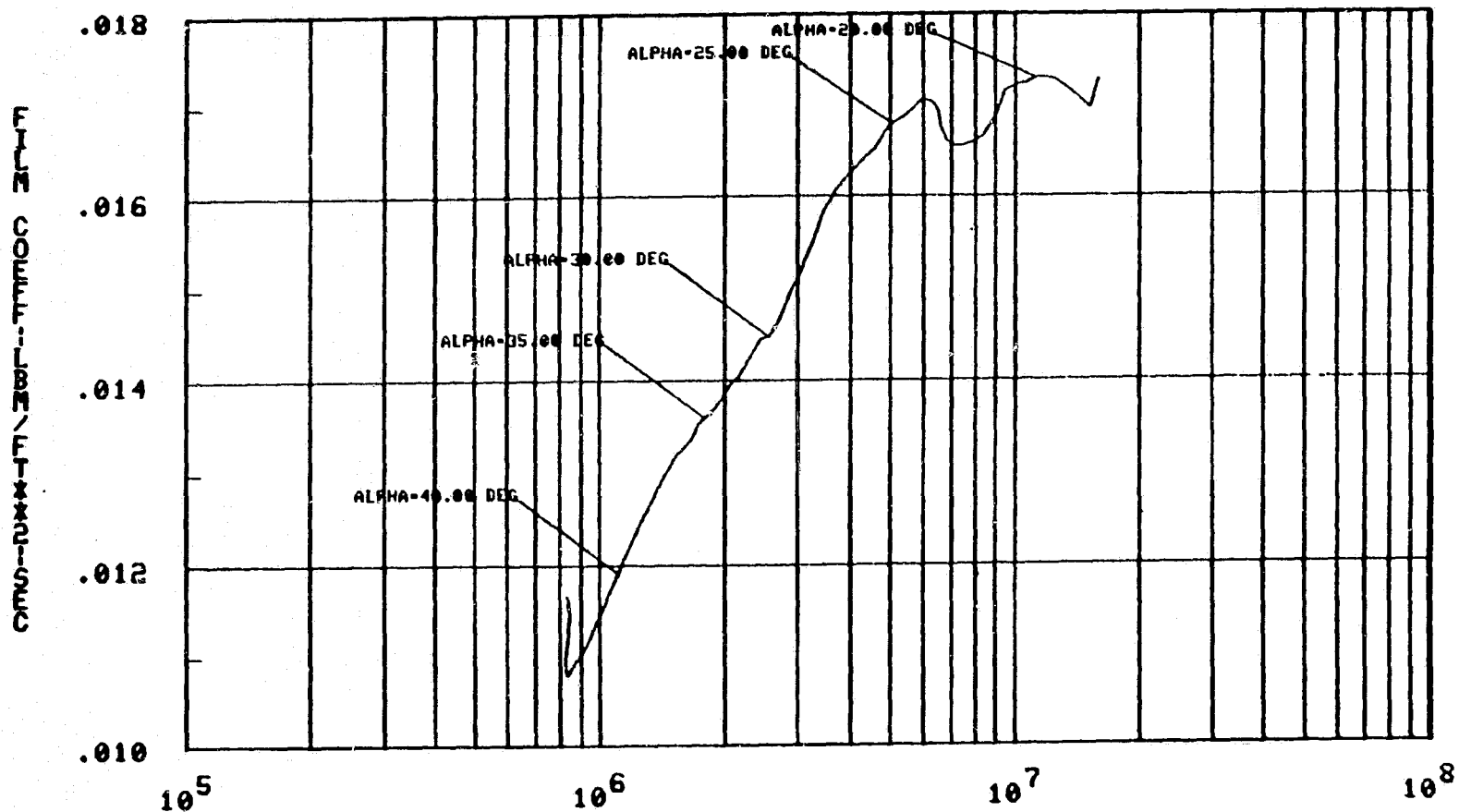
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HREF

965-1300 SEC



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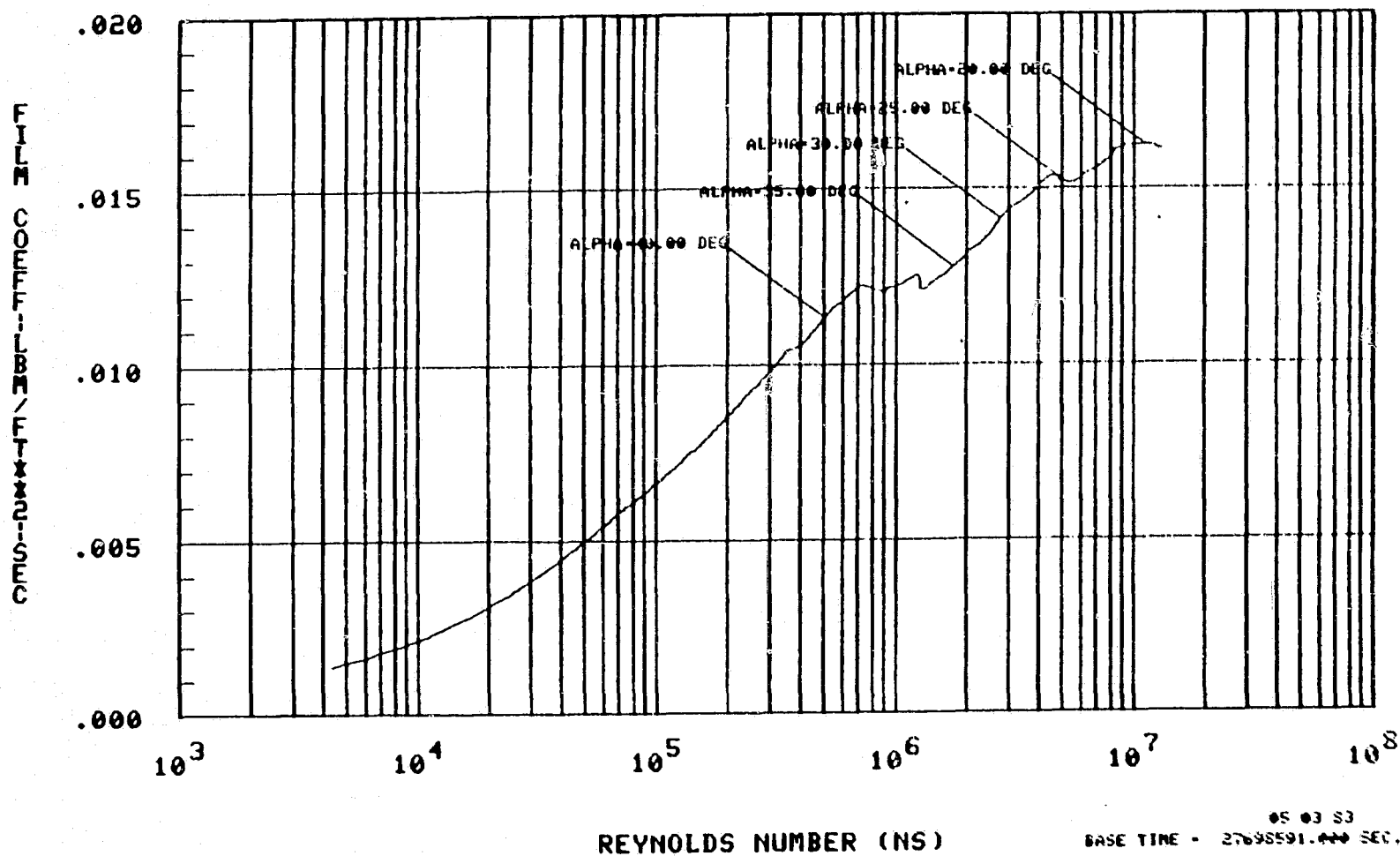
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A-69

STS-5 (107 FT LENGTH WING) FLIGHT PARAMETER COMPARISON

HREF

150-1350 SEC



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APPENDIX B

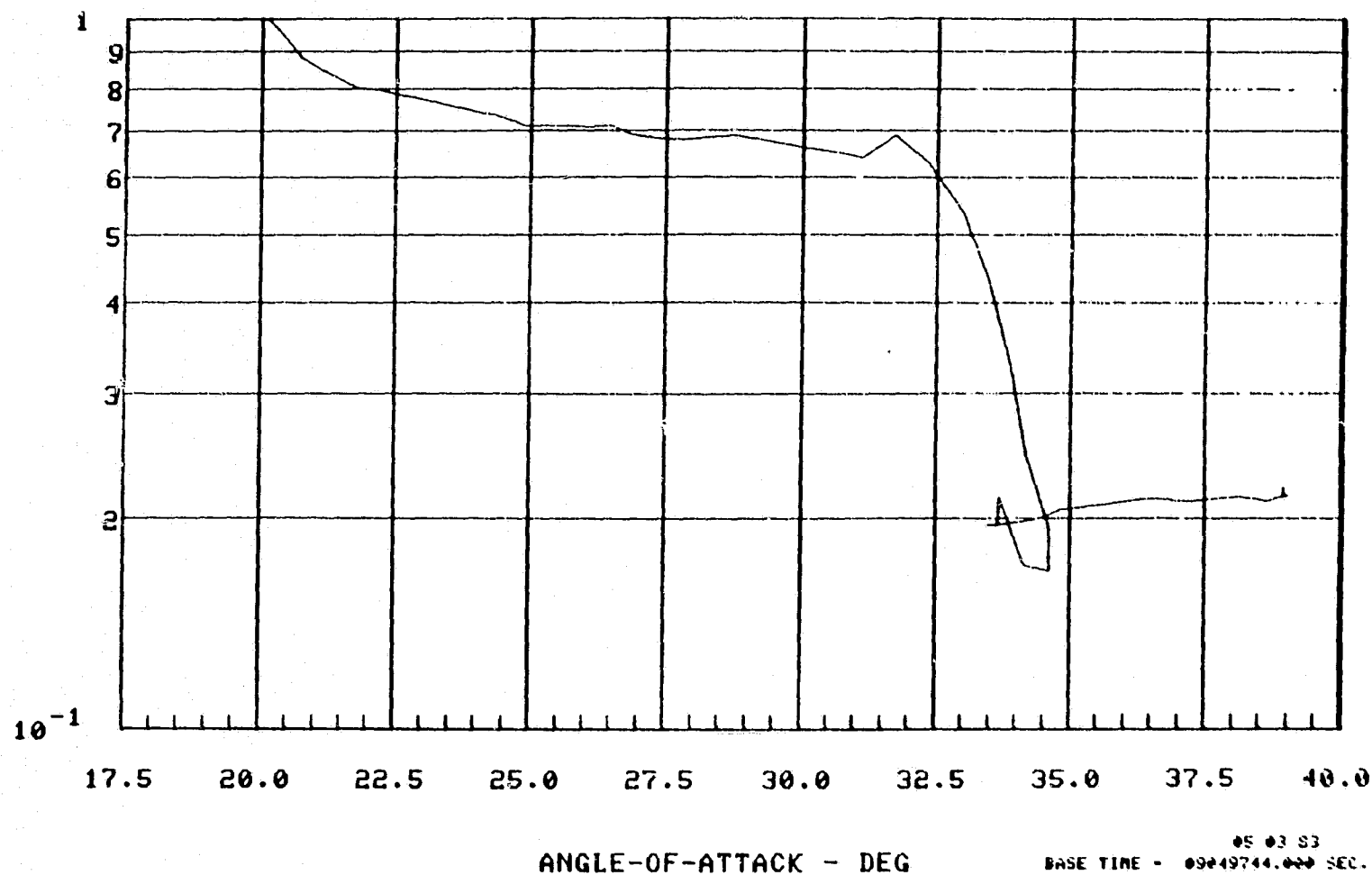
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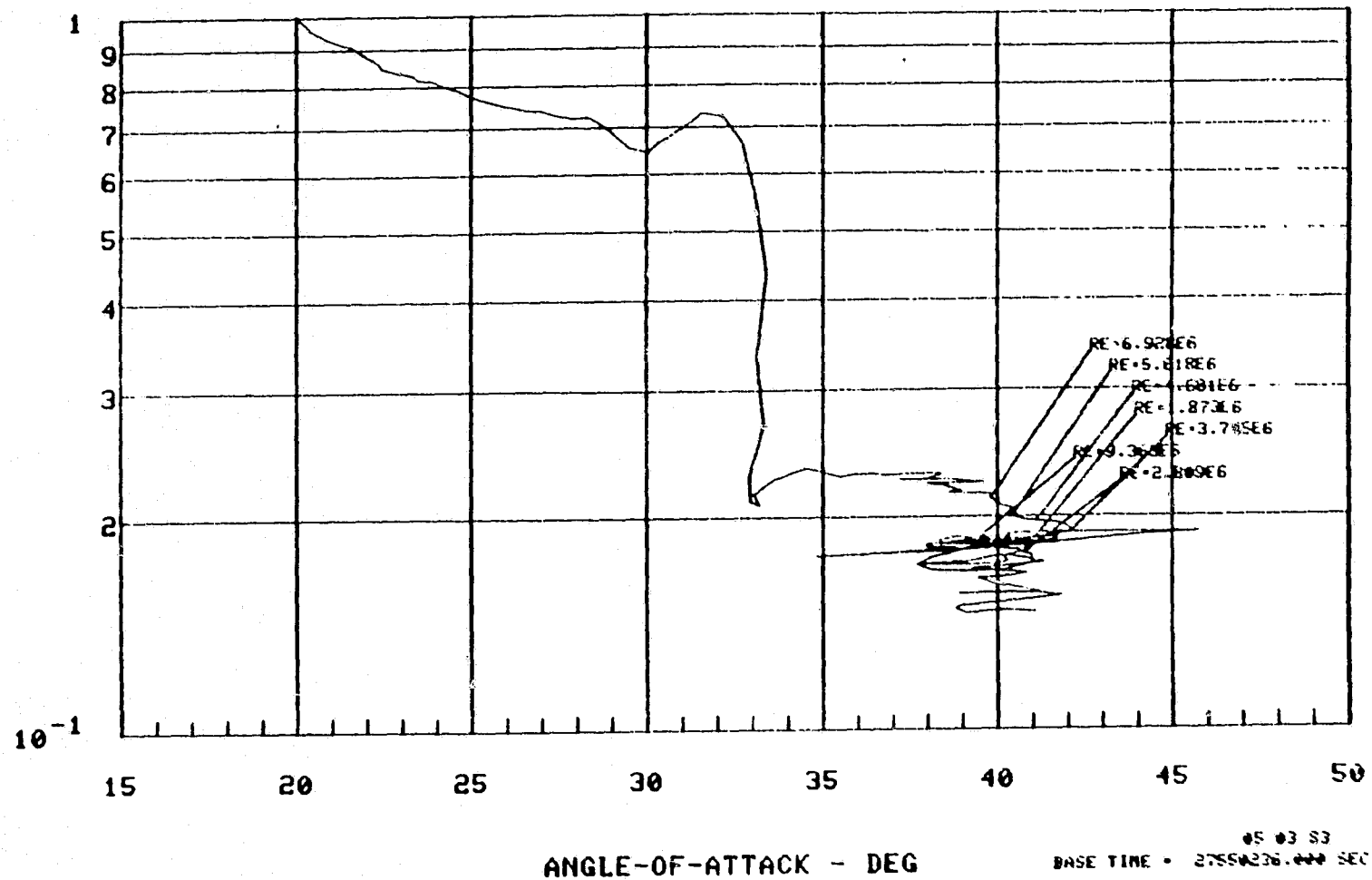
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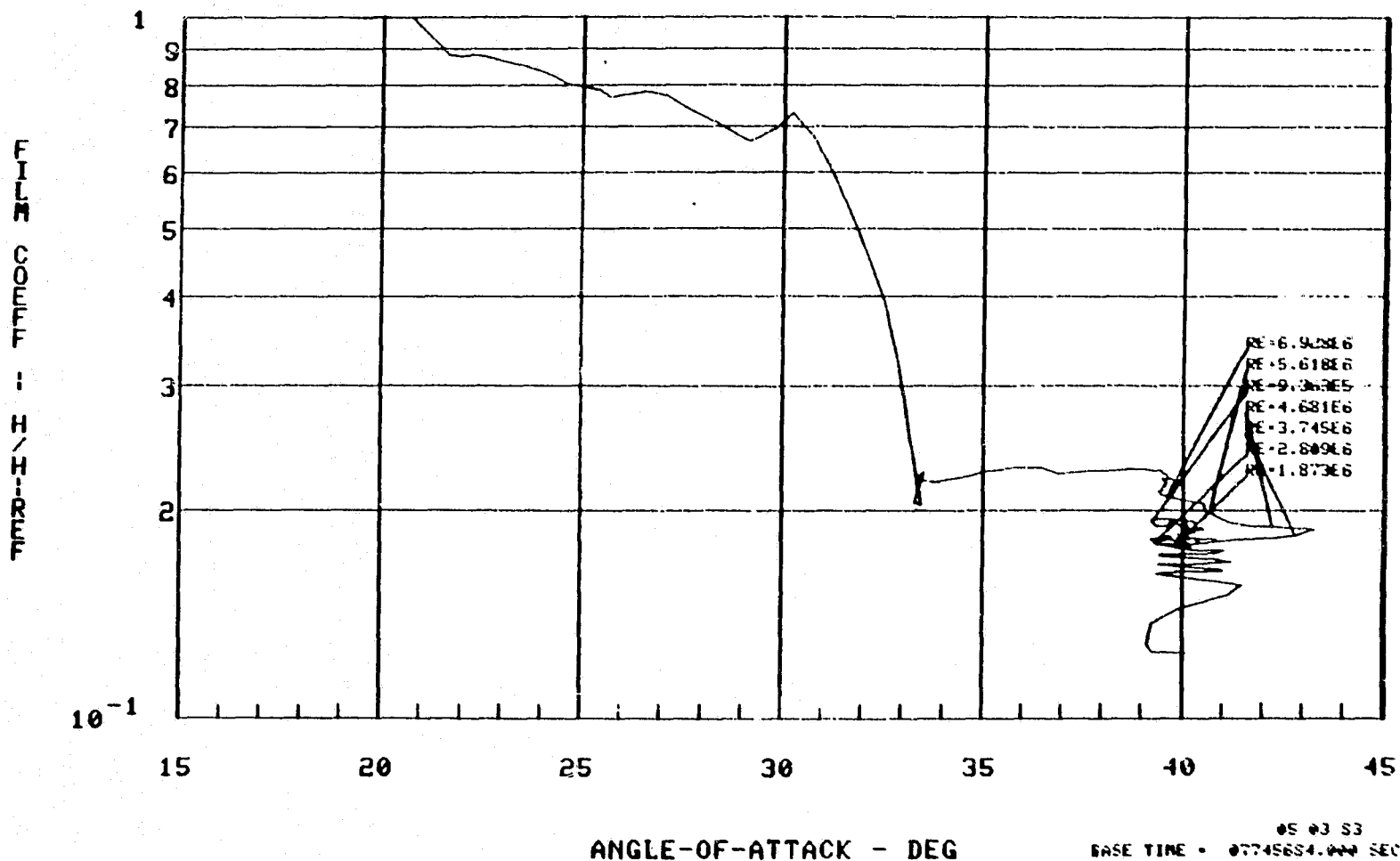
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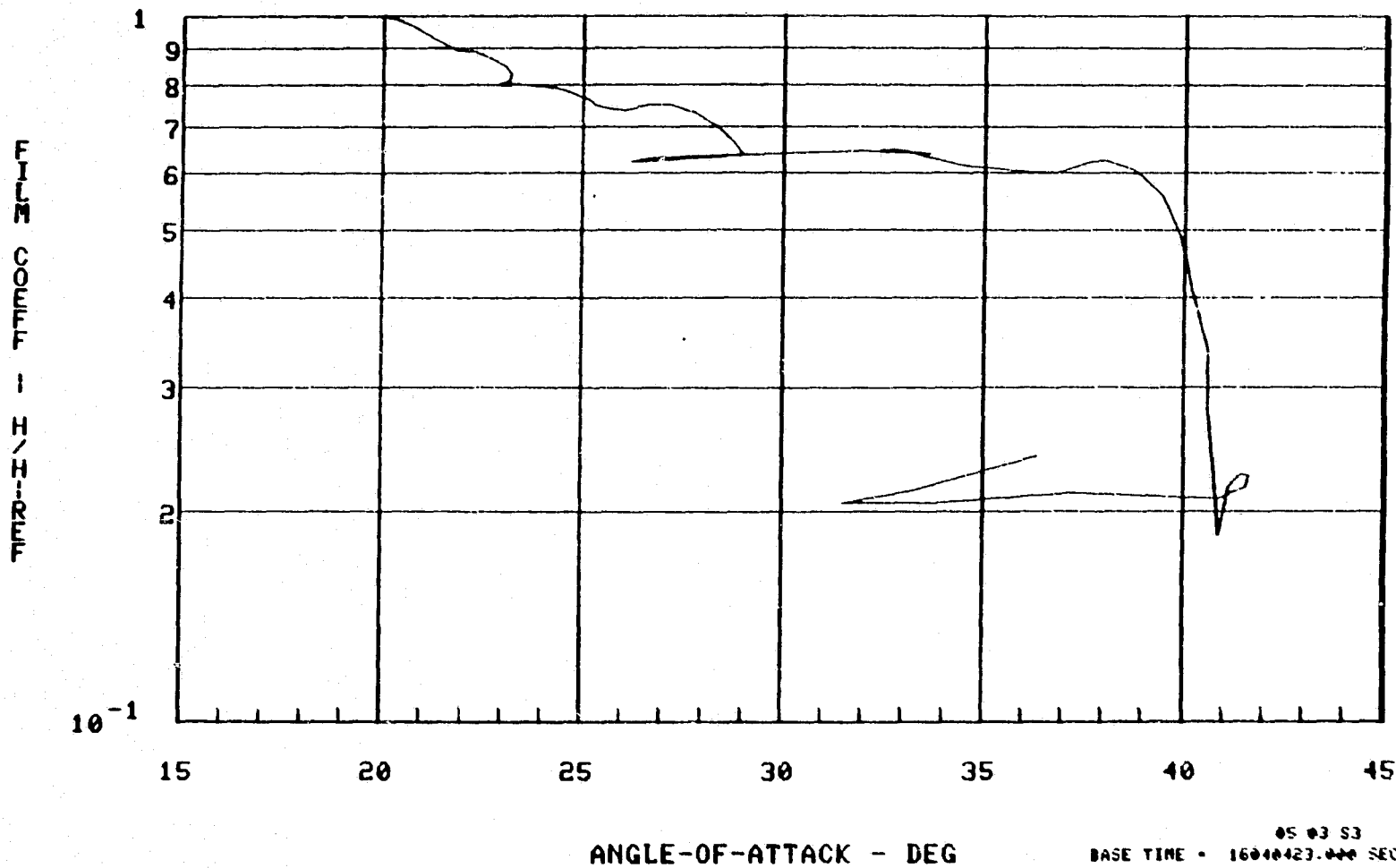
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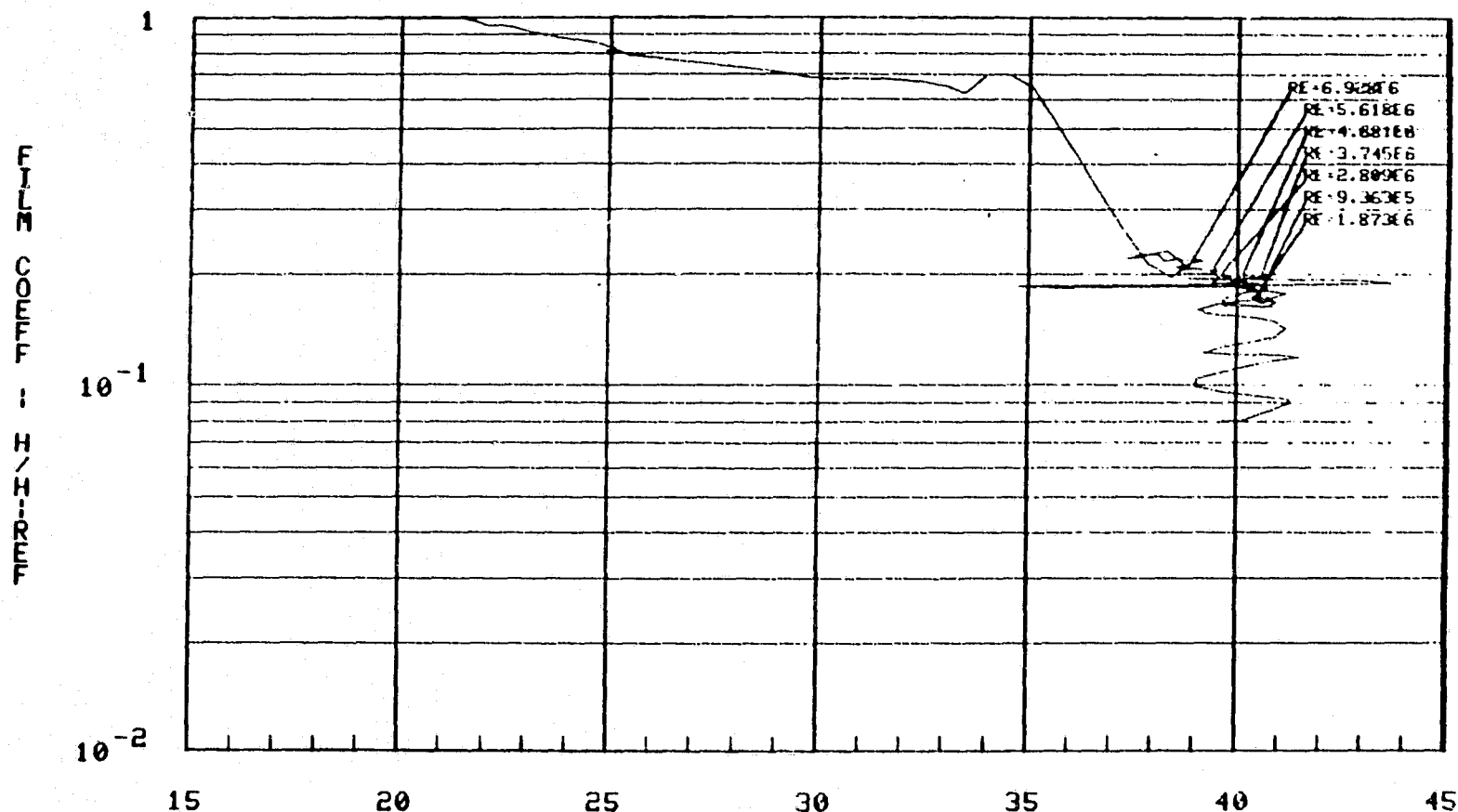
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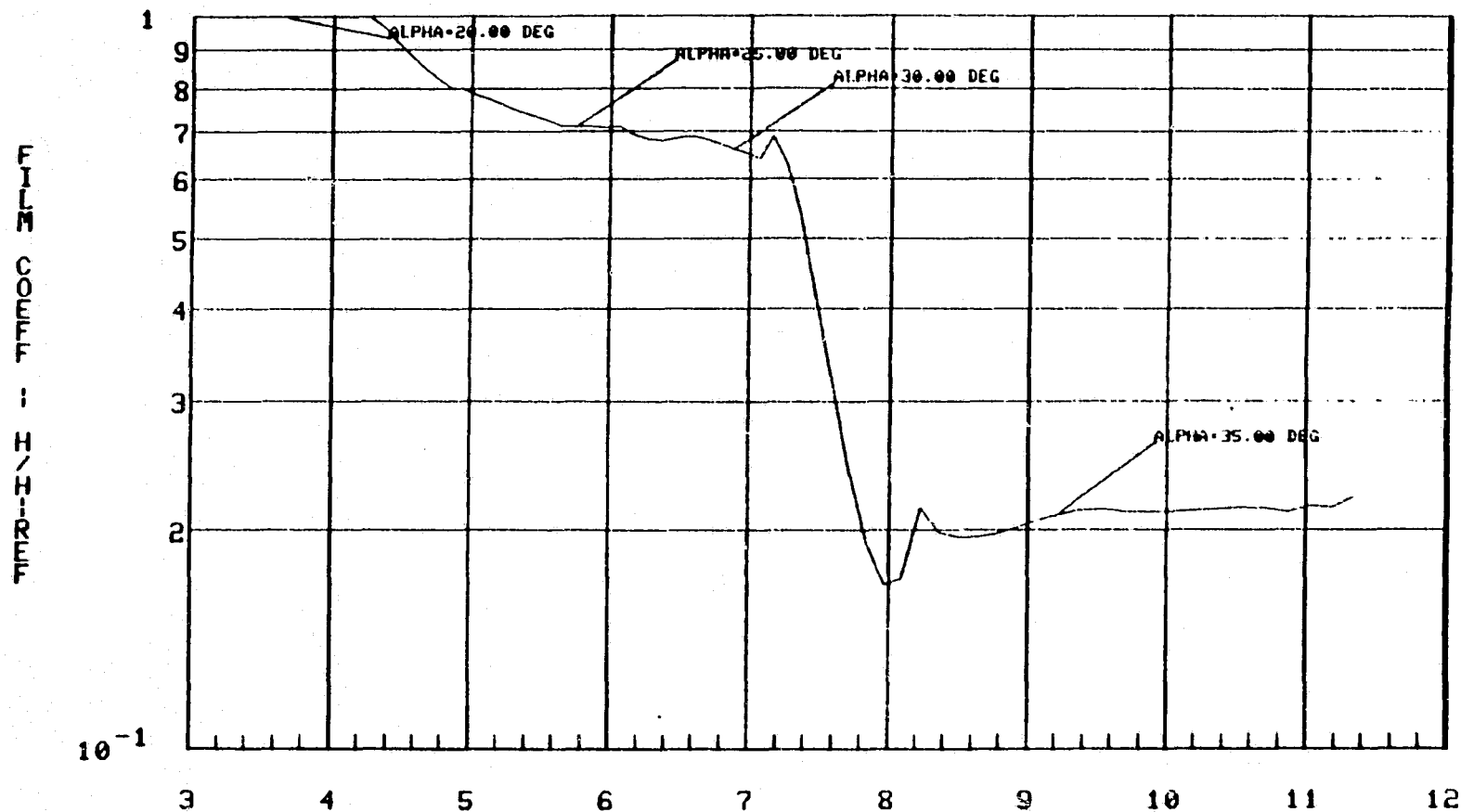
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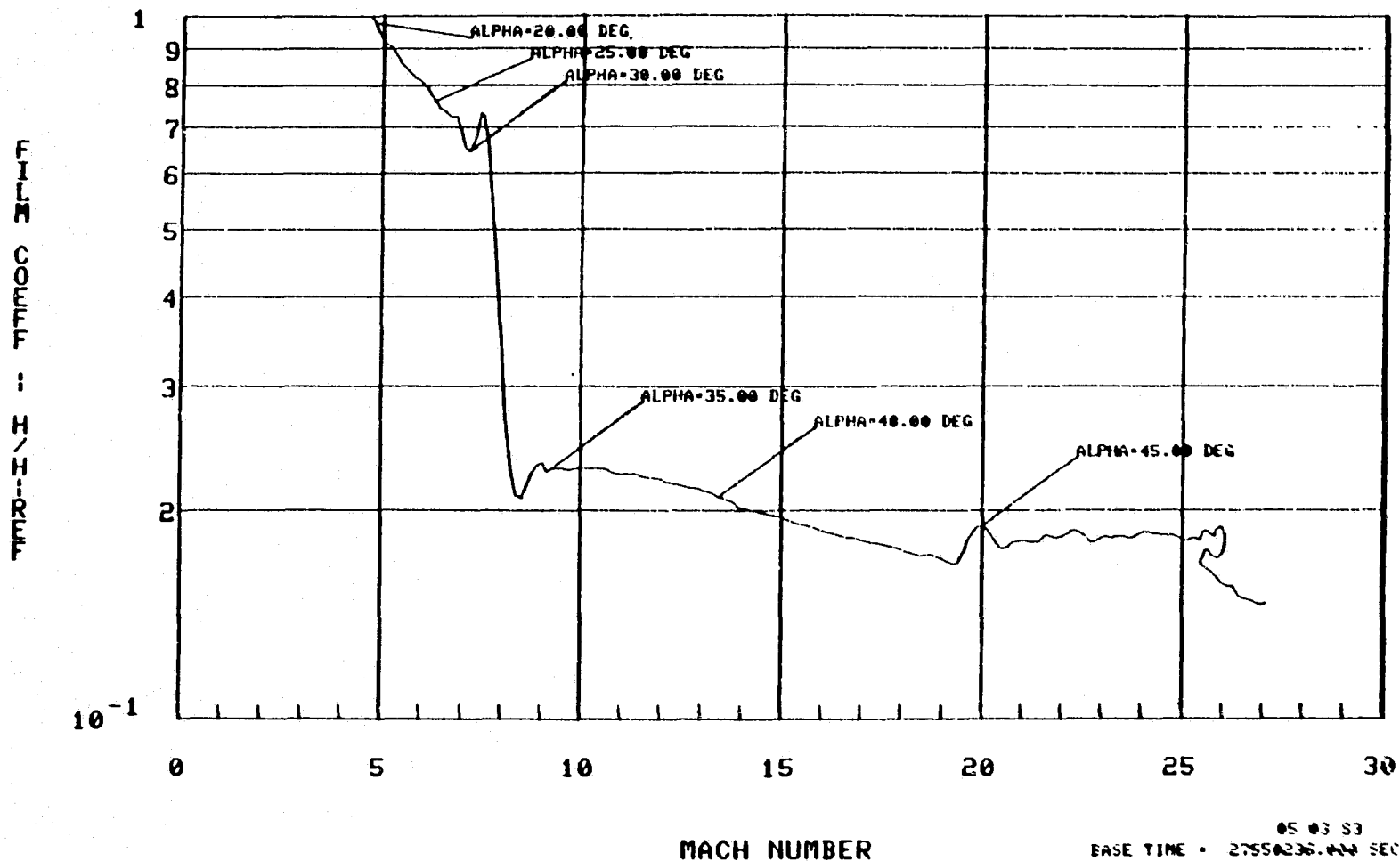
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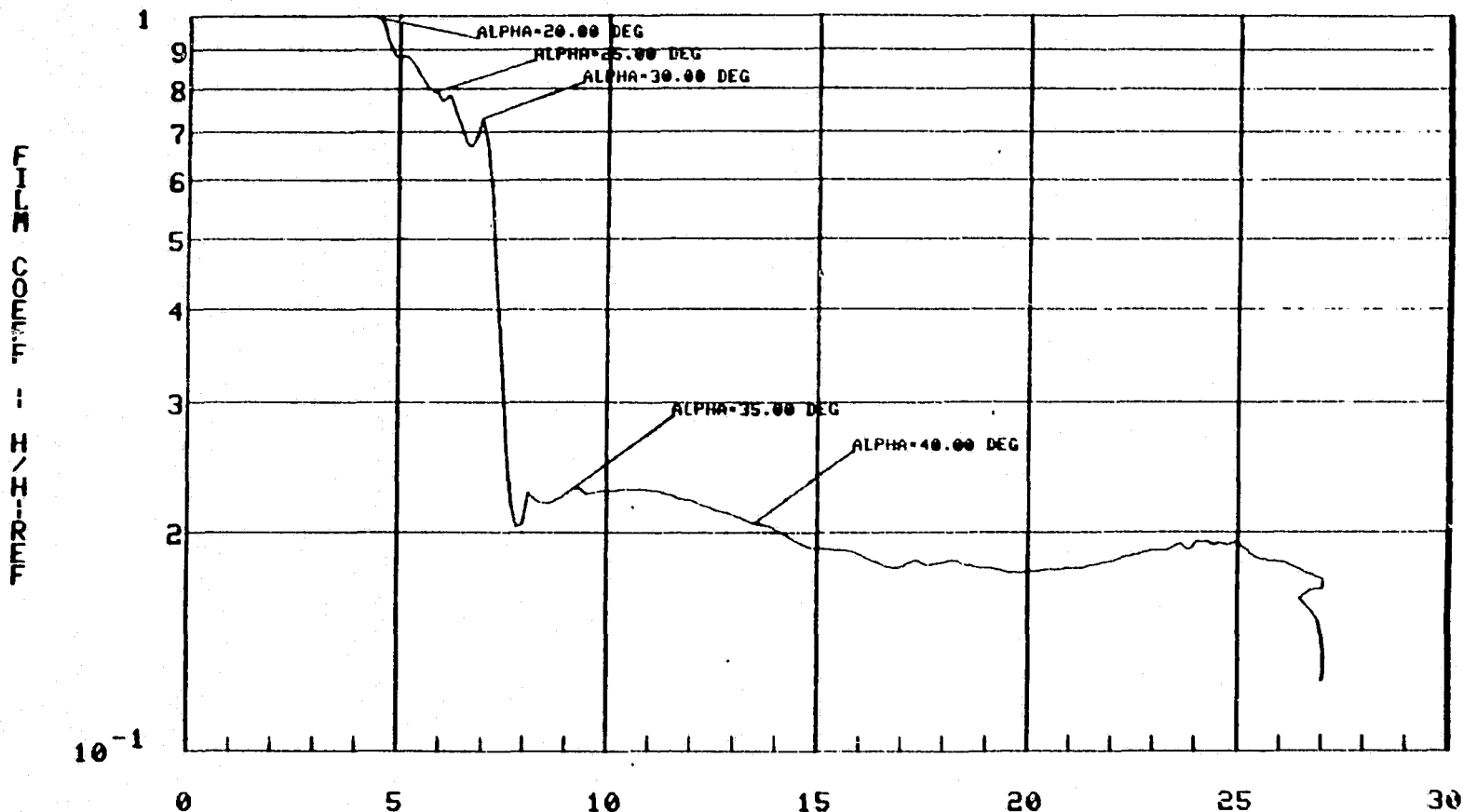
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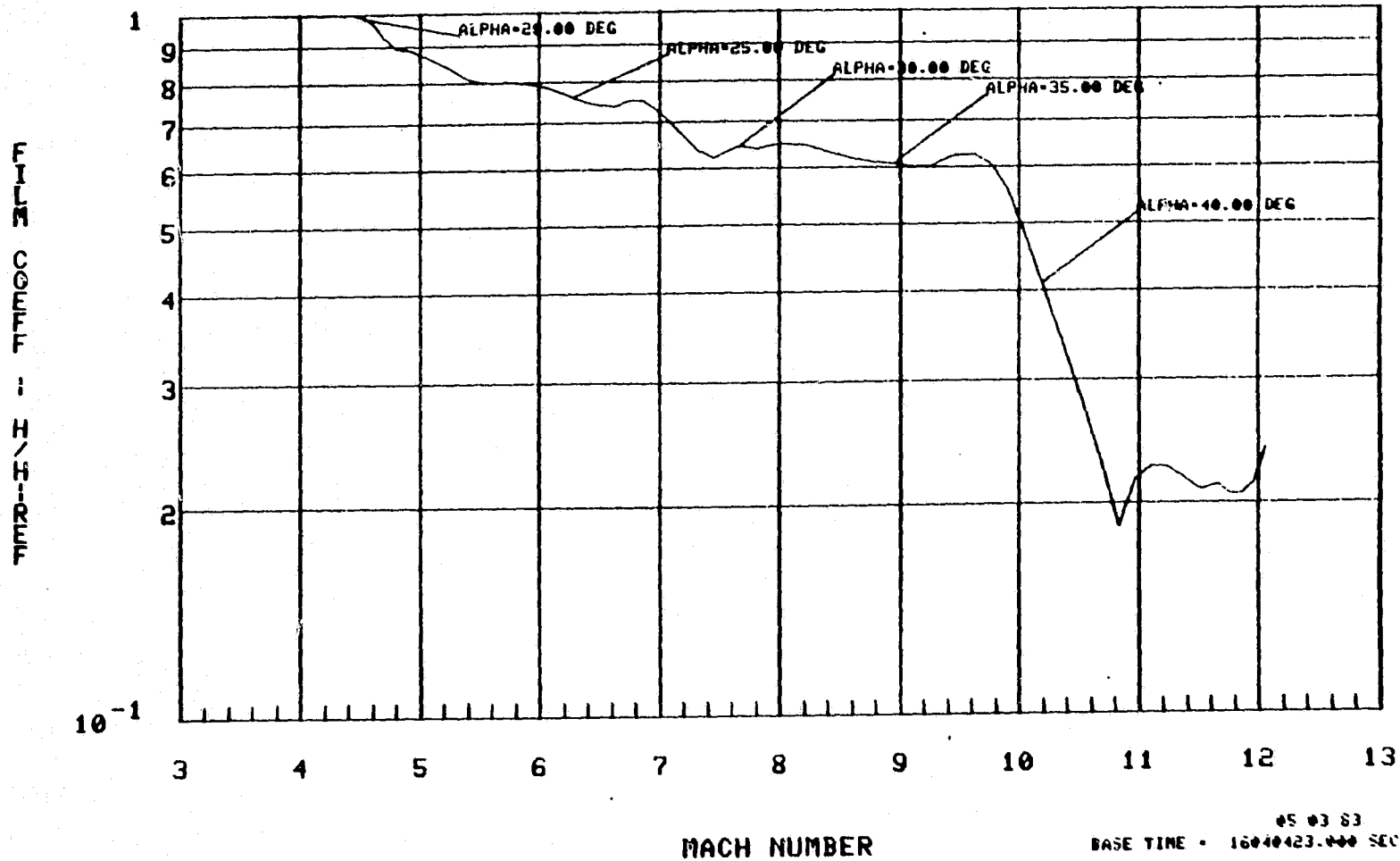
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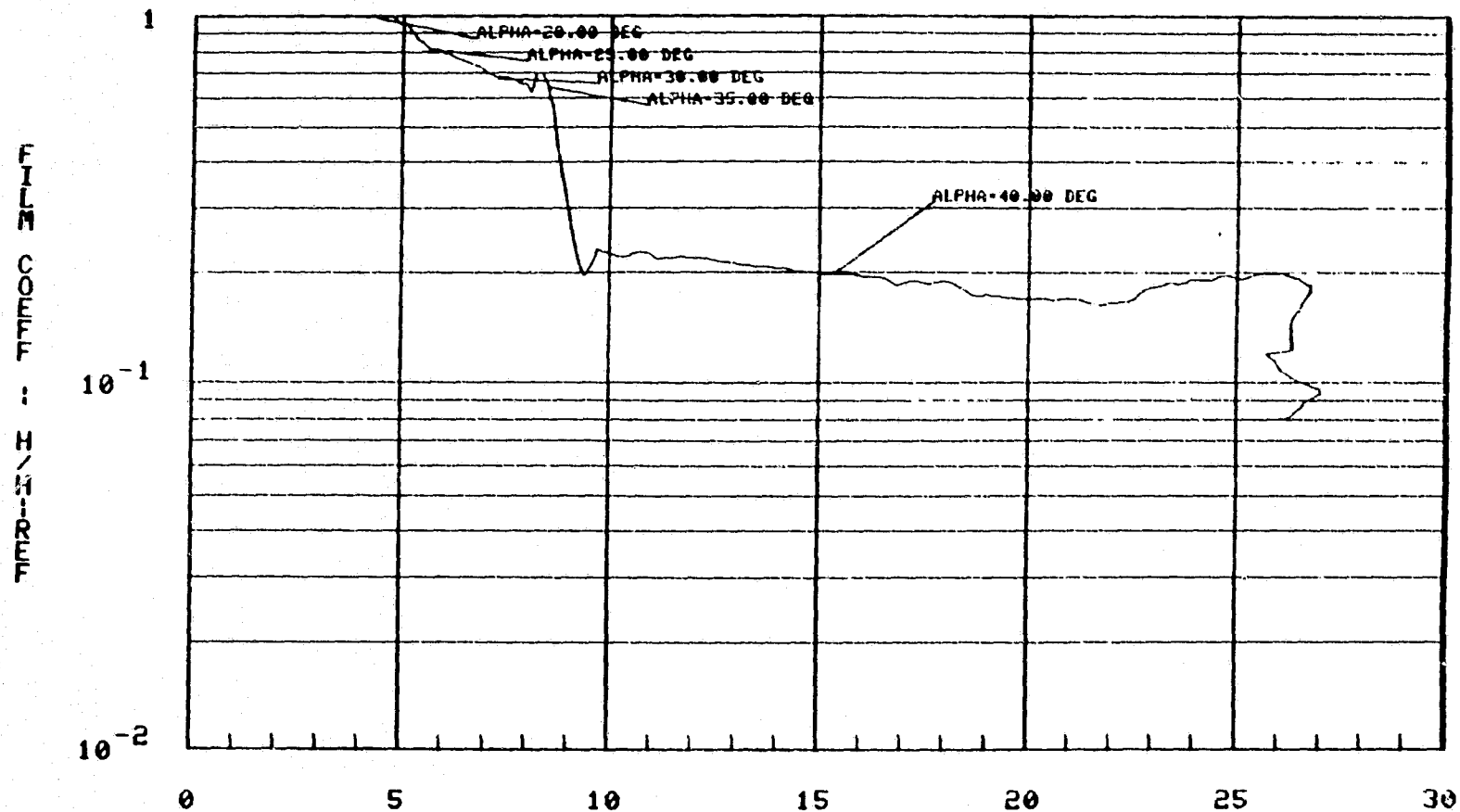
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U07T9666A/H-REF 965-1300 SEC



STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.13$

U07T9666A/H-REF 150-1350 SEC



B-10

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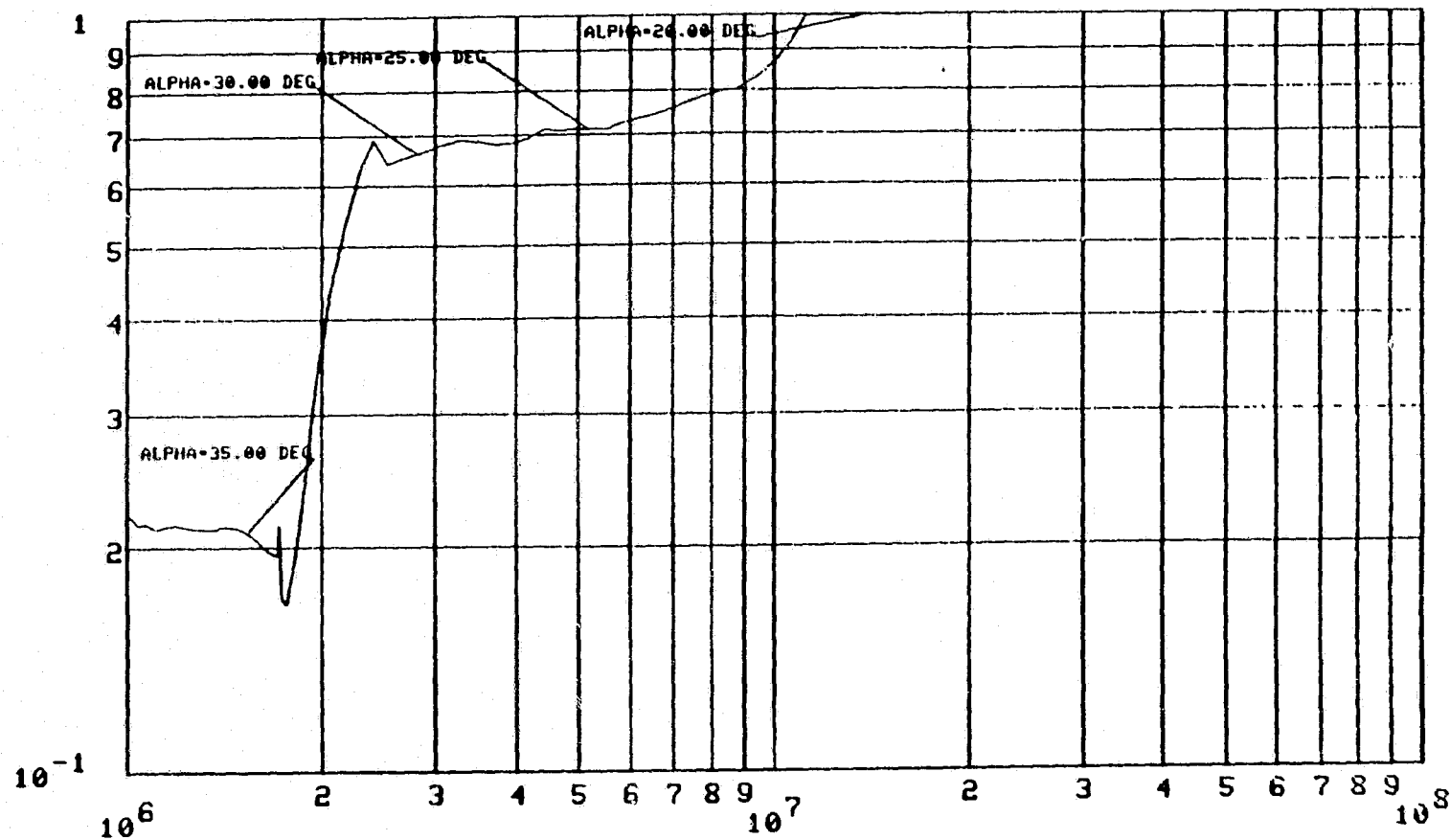
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B-77

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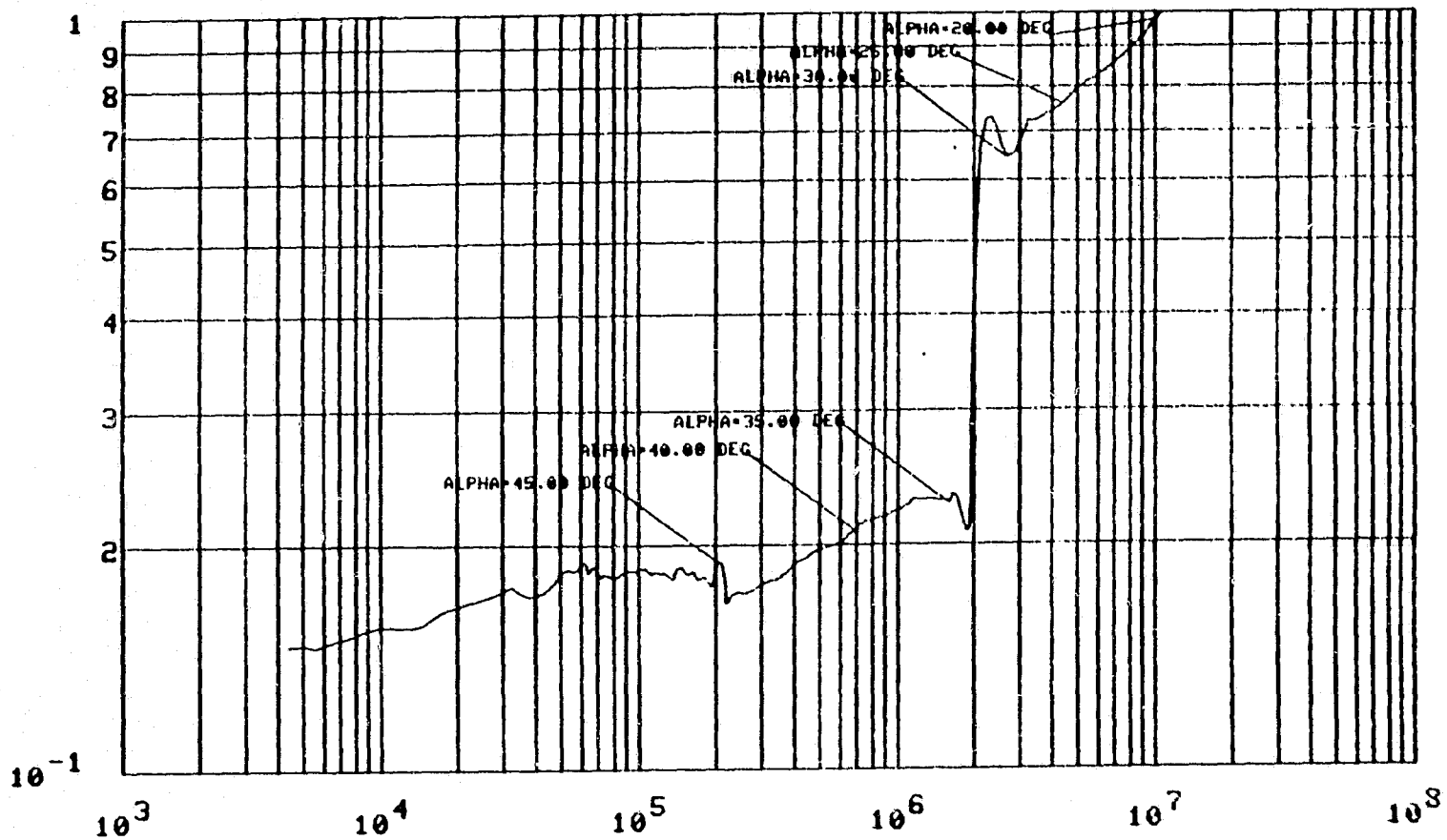


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B-12

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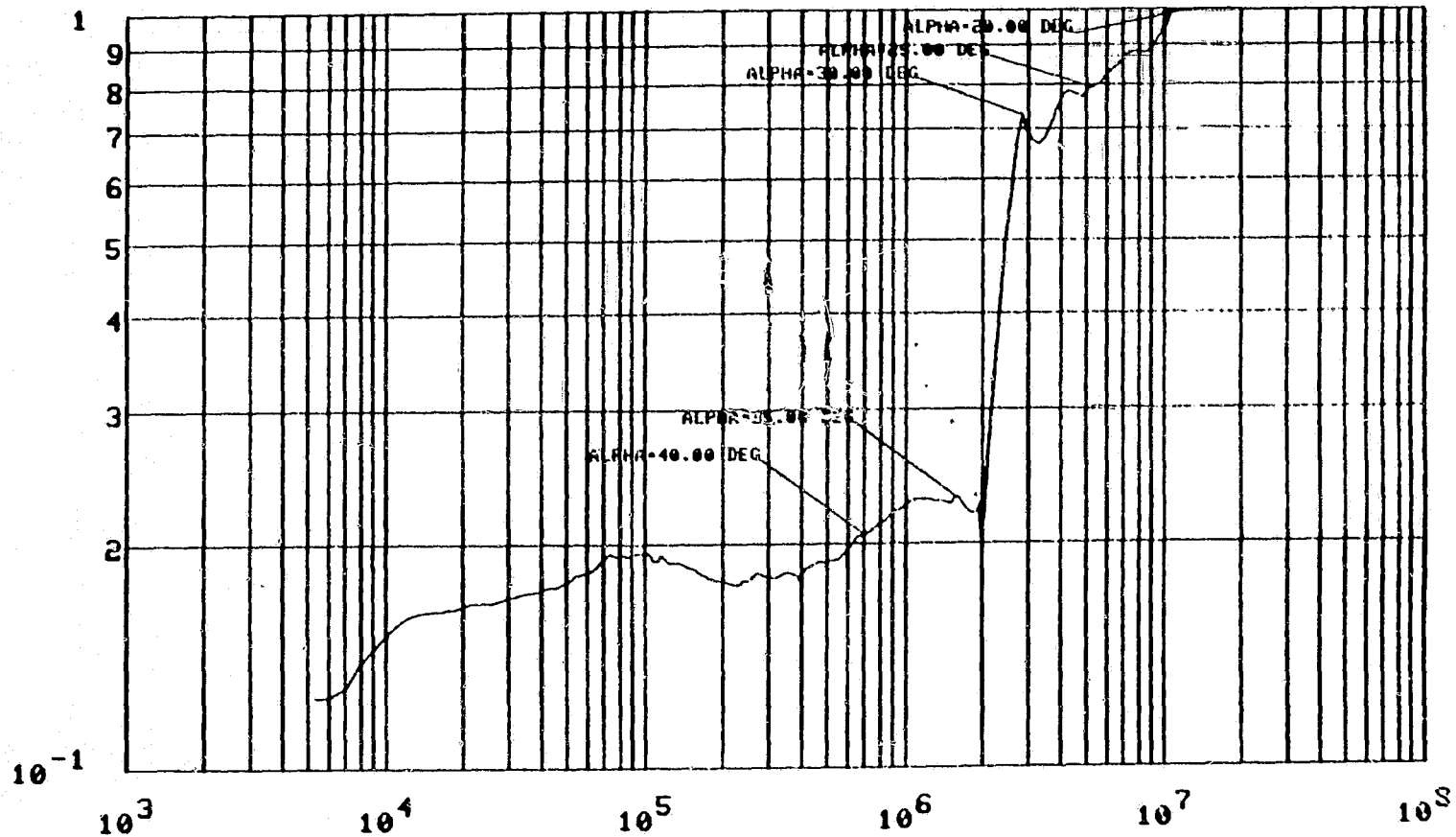
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WING COEFF. - H/H-REF

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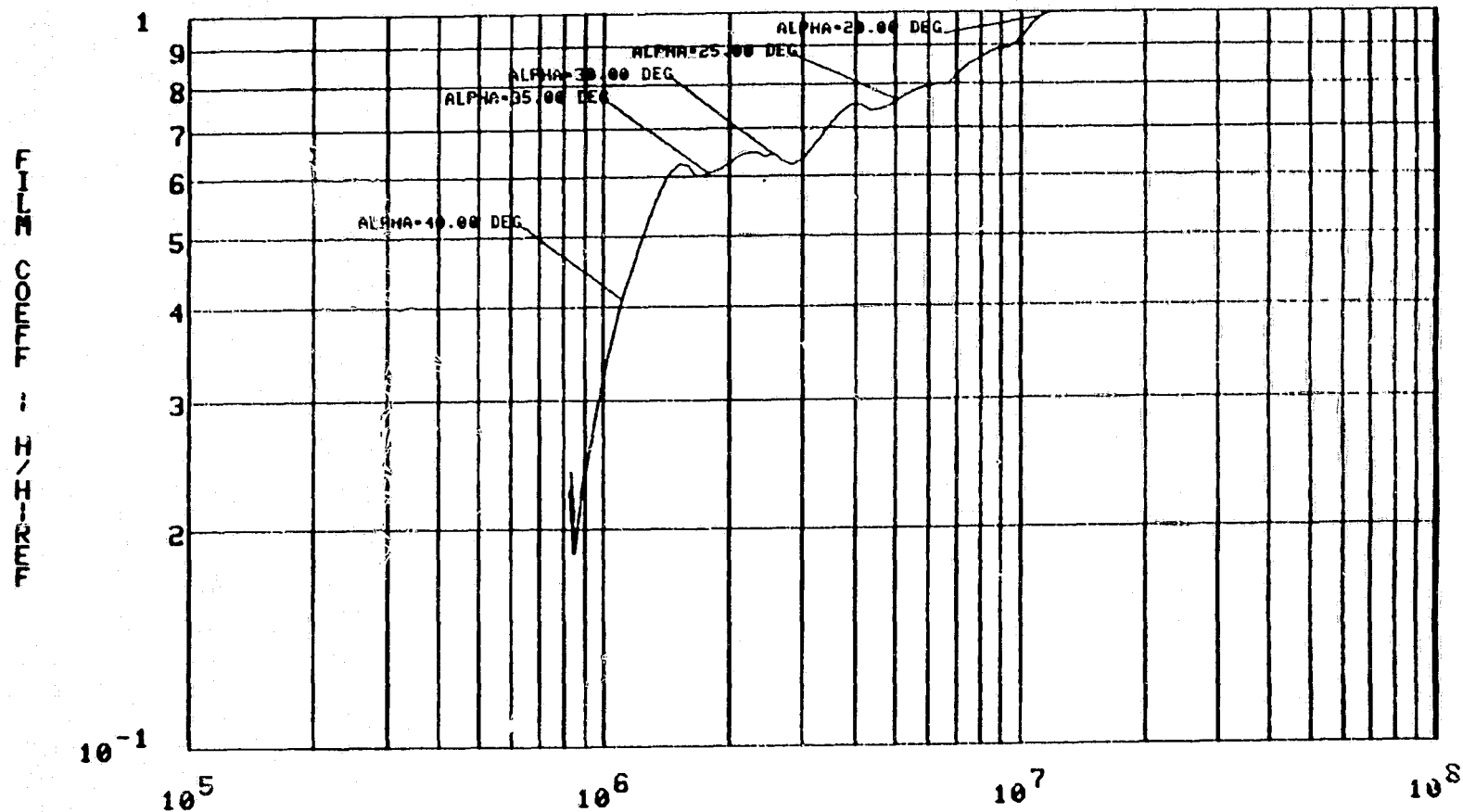


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B-14

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REYNOLDS NUMBER (NS)

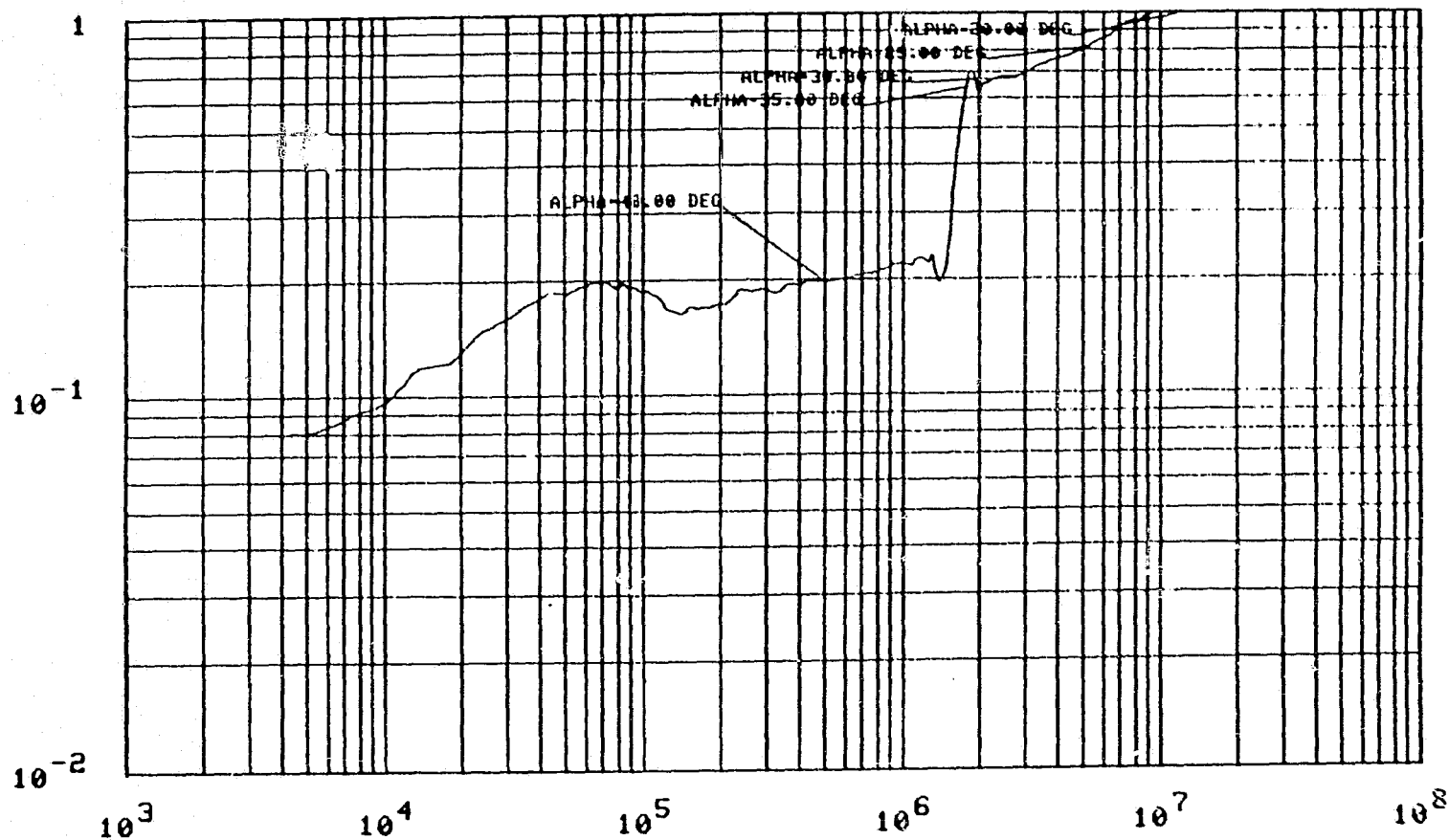
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U07T9666A/H-REF 150-1350 SEC

FILE CODE : H-H-REF

B-15



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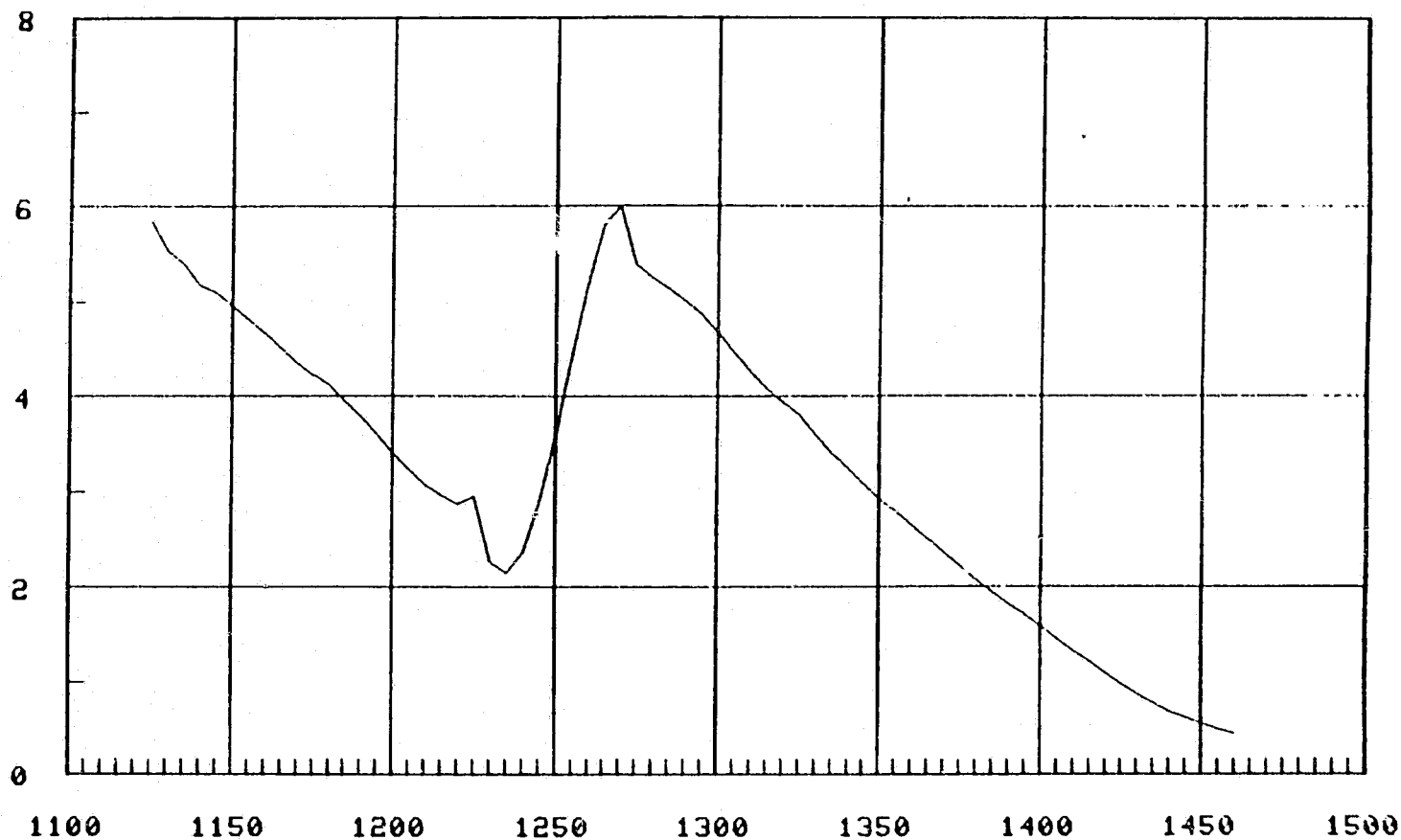
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HEATING RATE - BTU/FT**2 - SEC



TIME - SECONDS

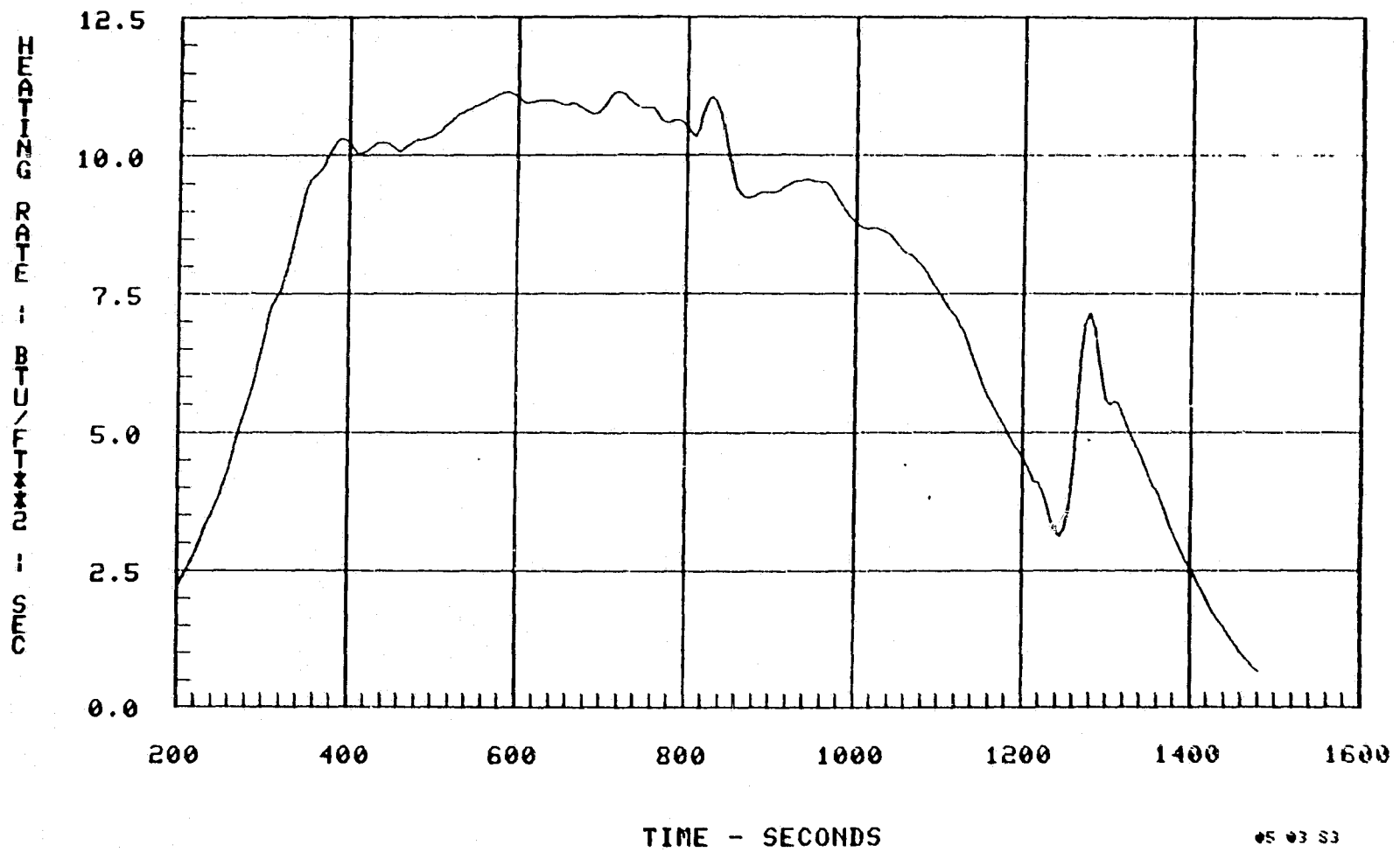
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B-16

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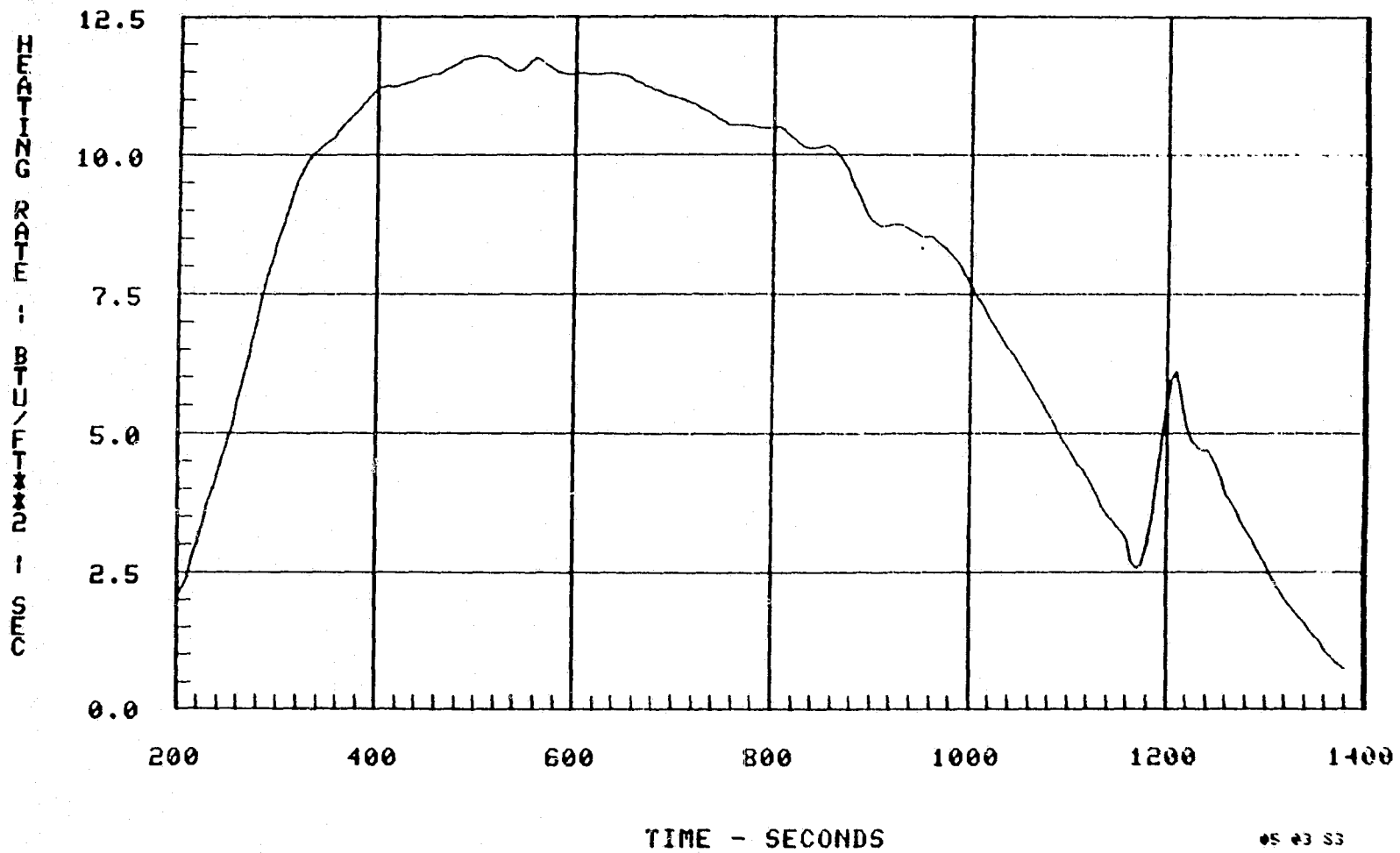
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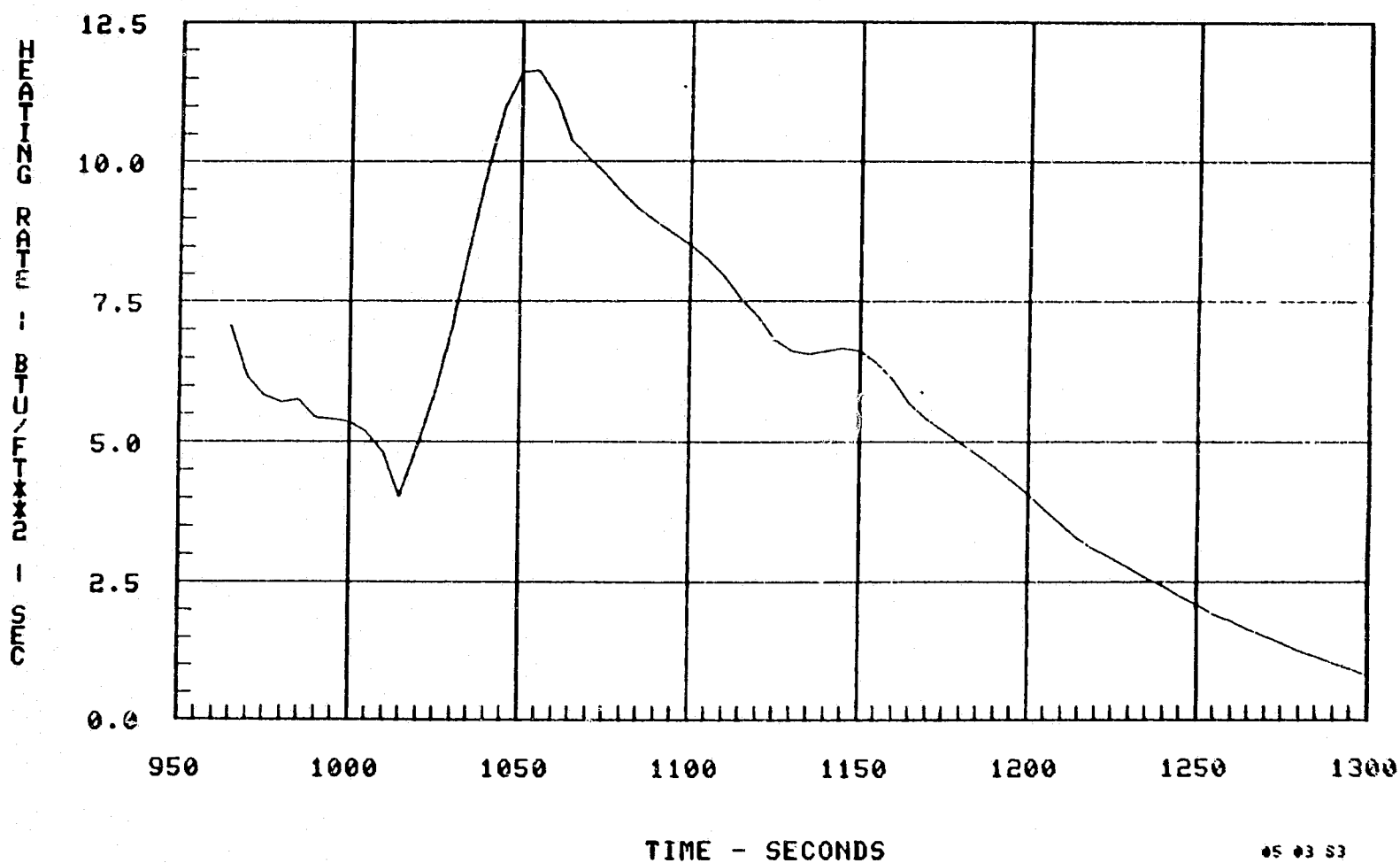
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U07T9666A



STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.13$

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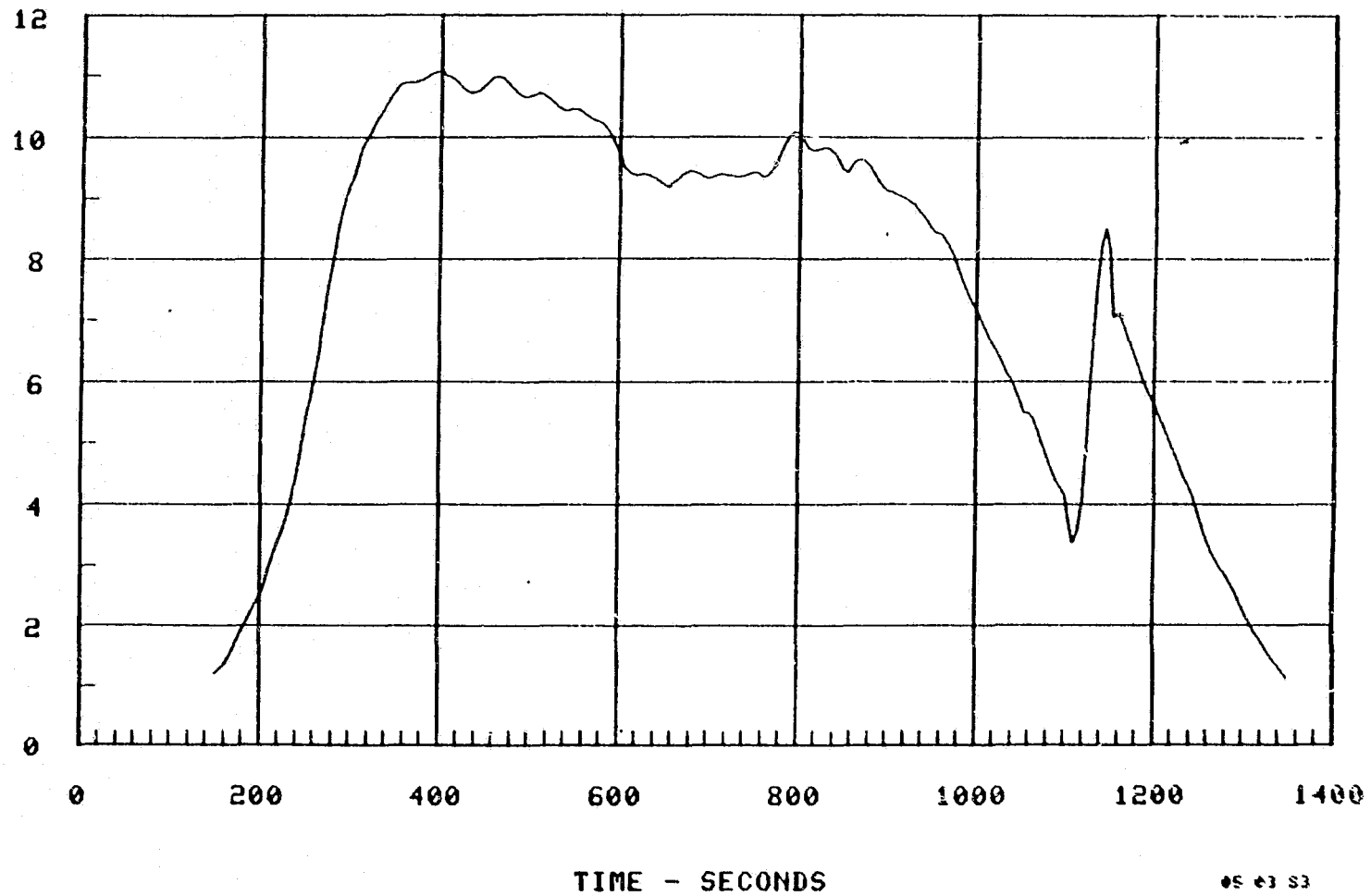


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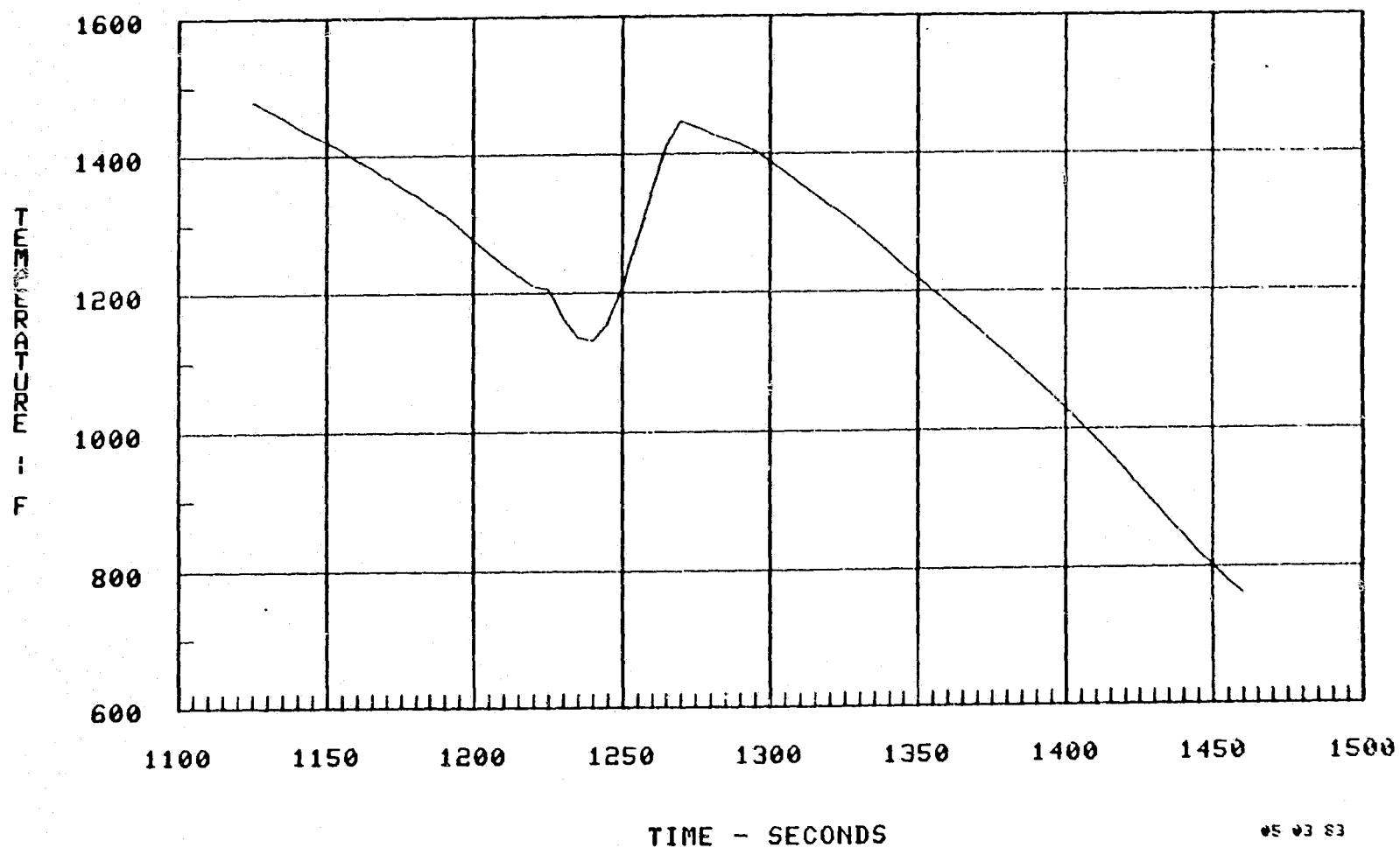
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B-20

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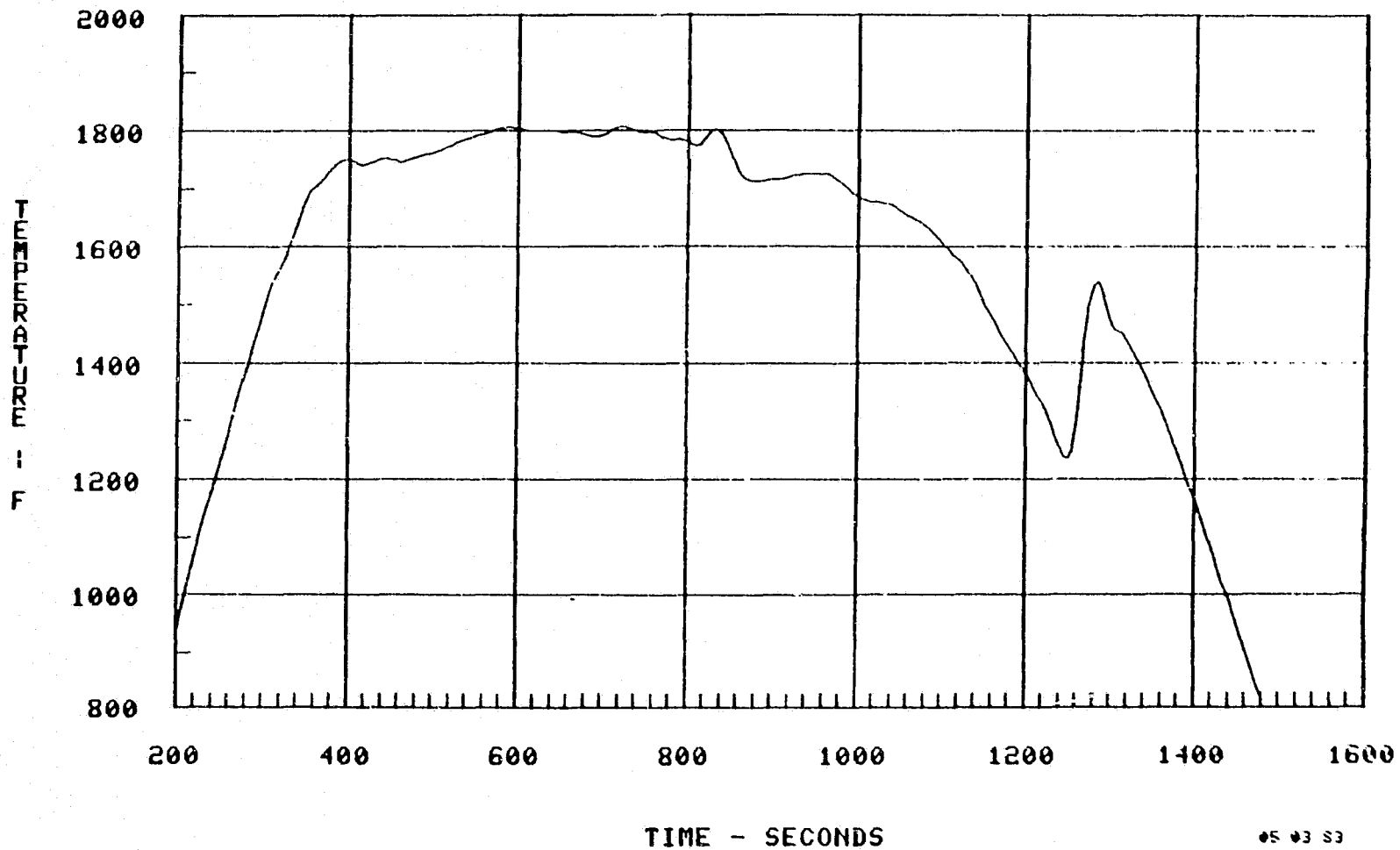
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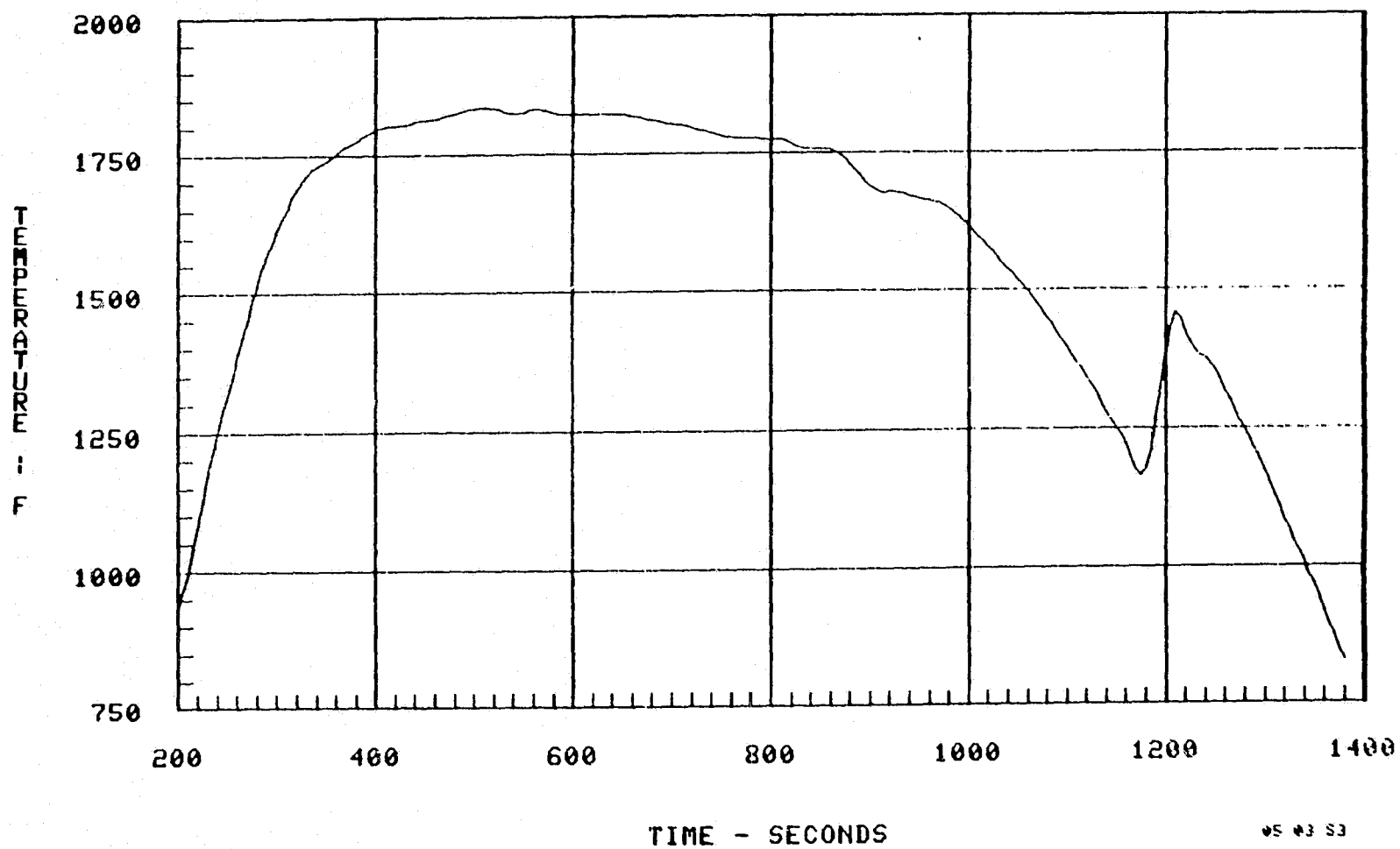
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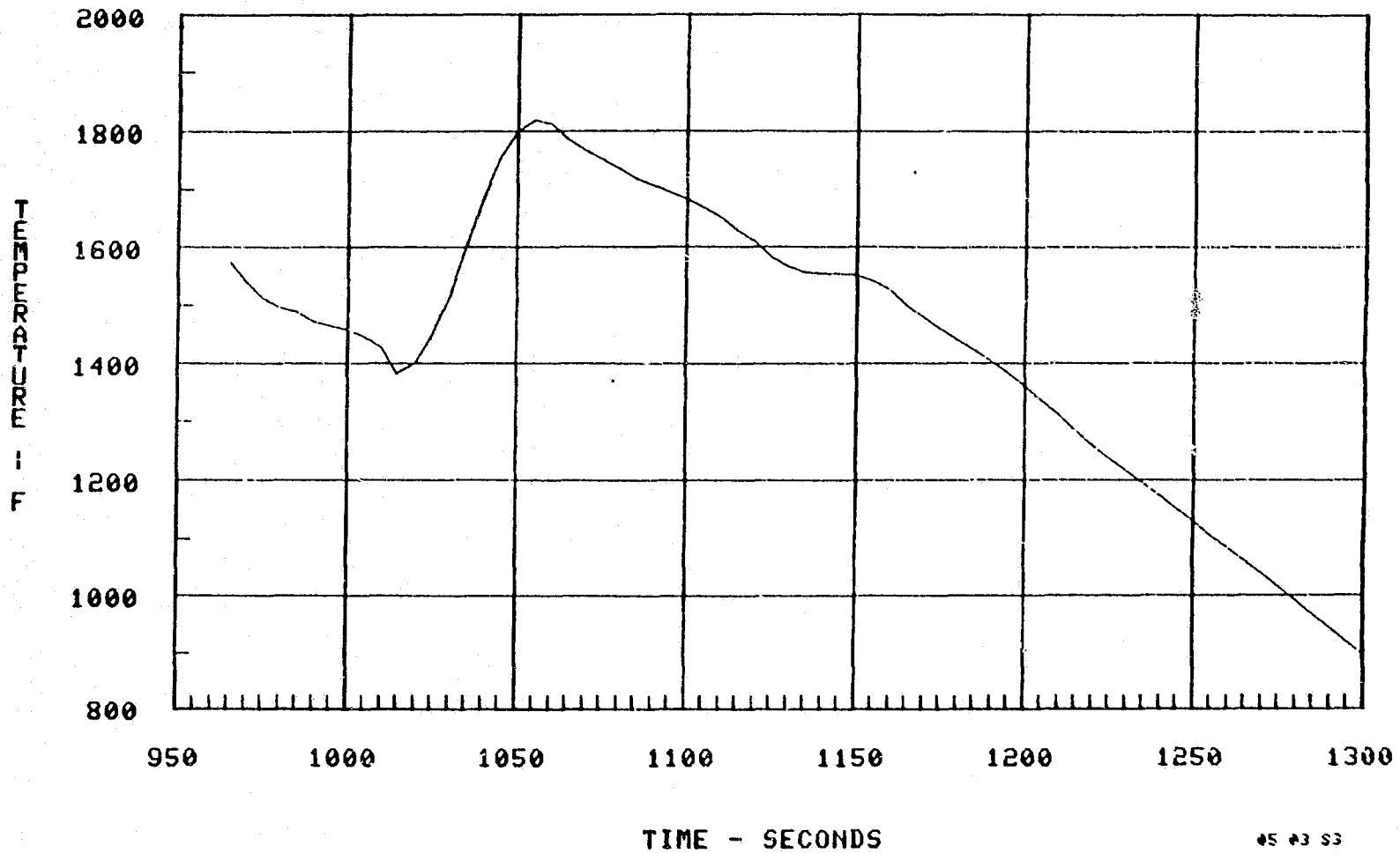
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B-23

05 03 53

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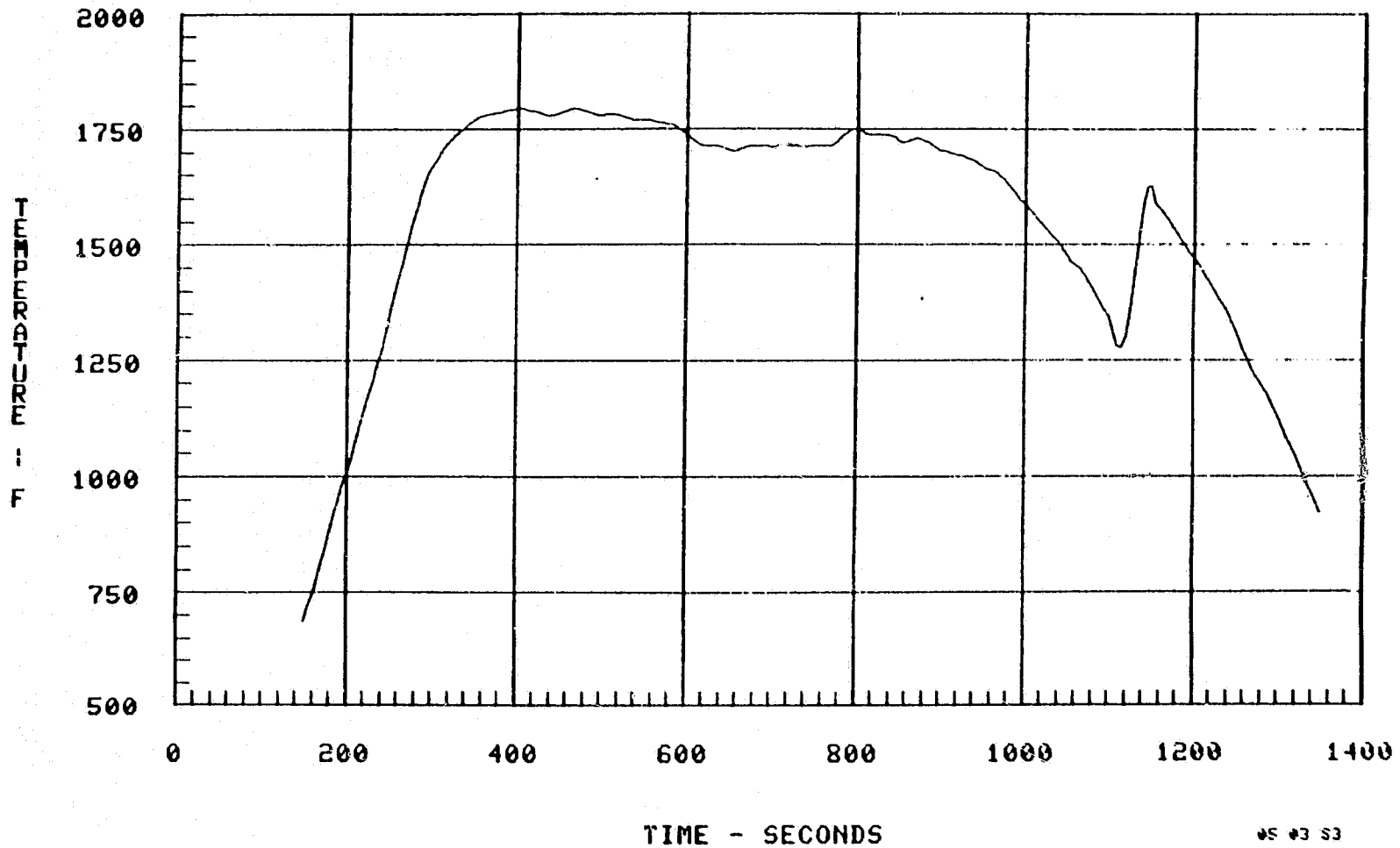
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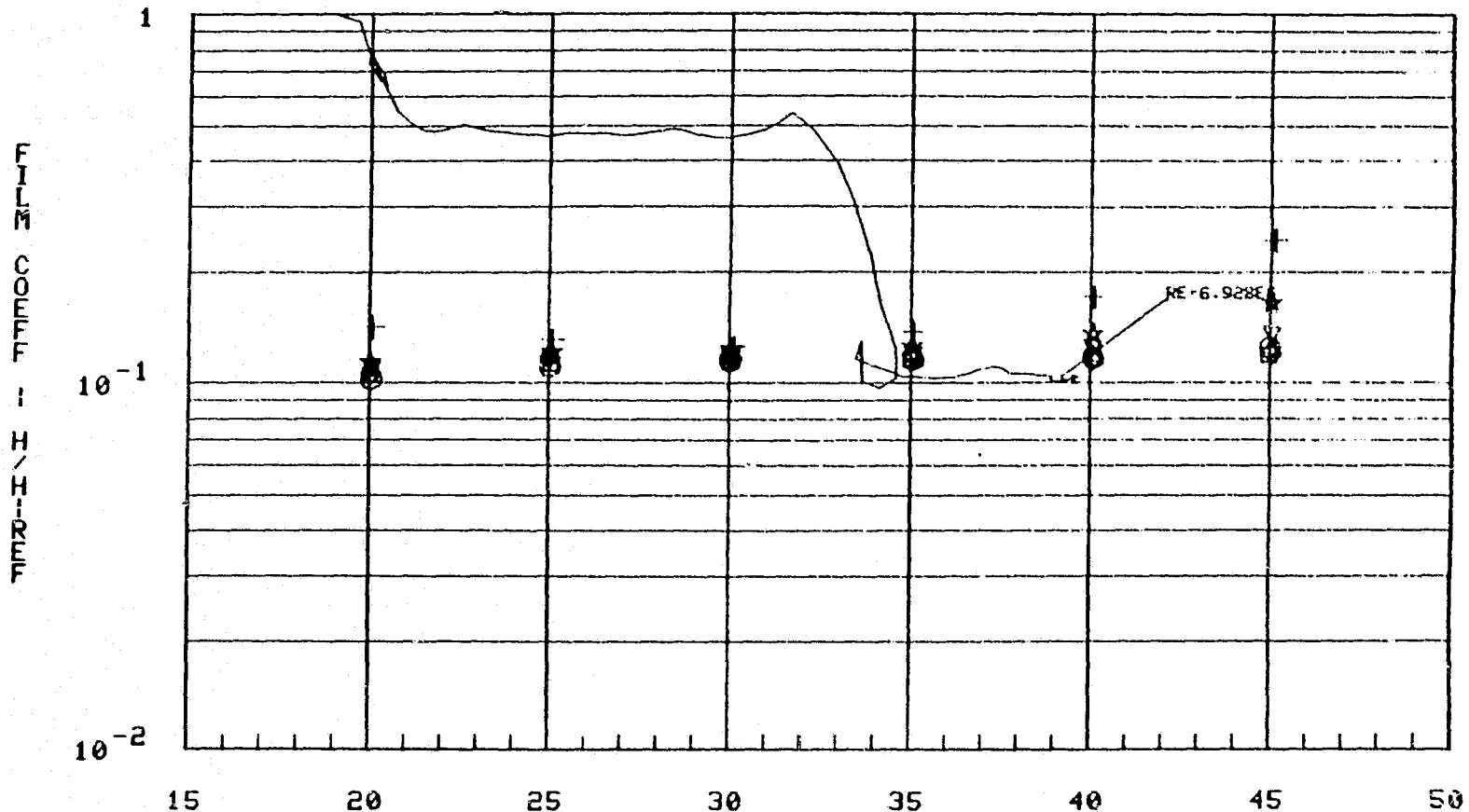
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QUALITY

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9668A/H-REF 1065-1460 SEC



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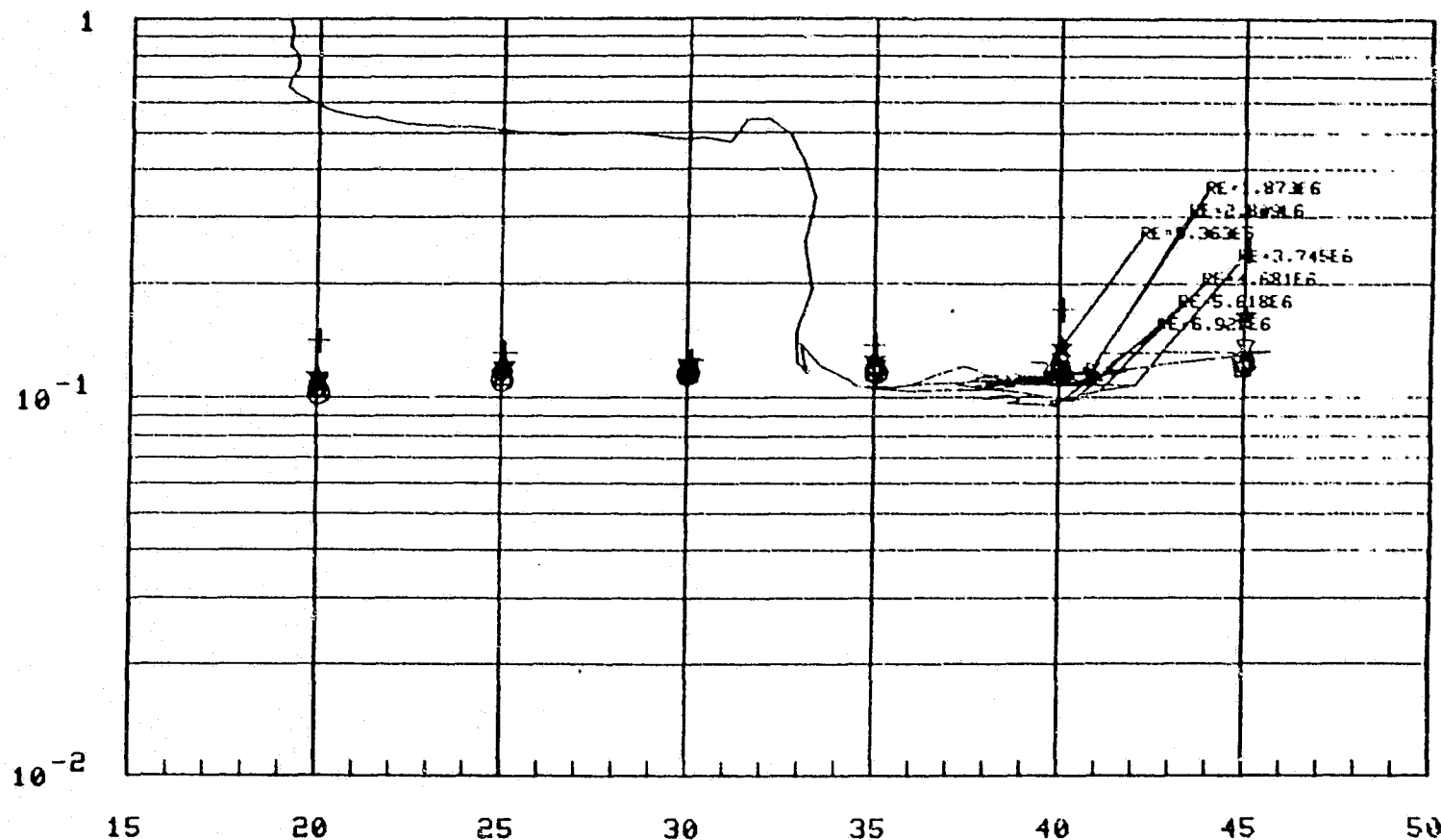
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OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
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U07T9662A/H-REF 200-1480 SEC

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ANGLE-OF-ATTACK - DEG

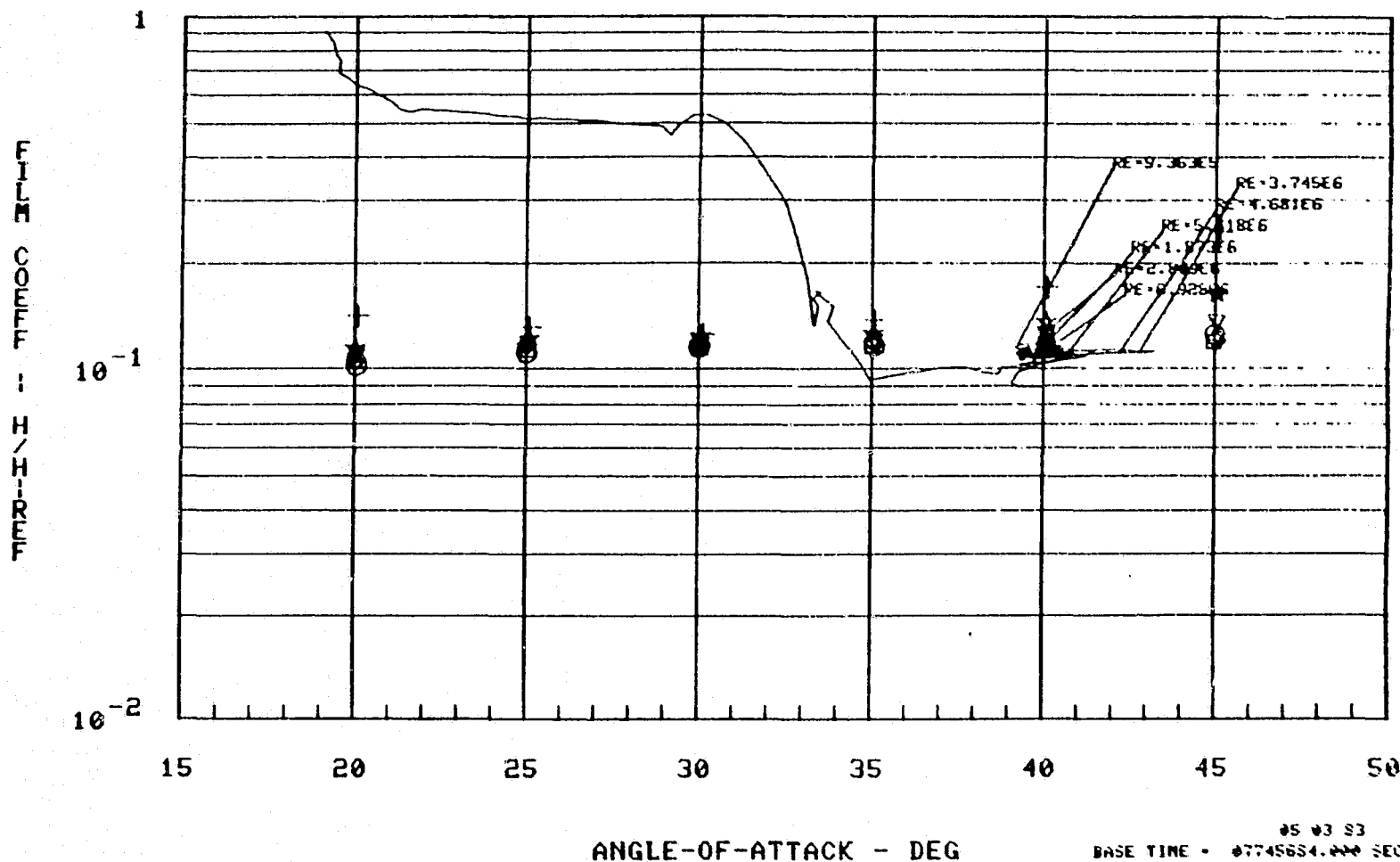
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U07T9668A/H-REF 200-1380 SEC



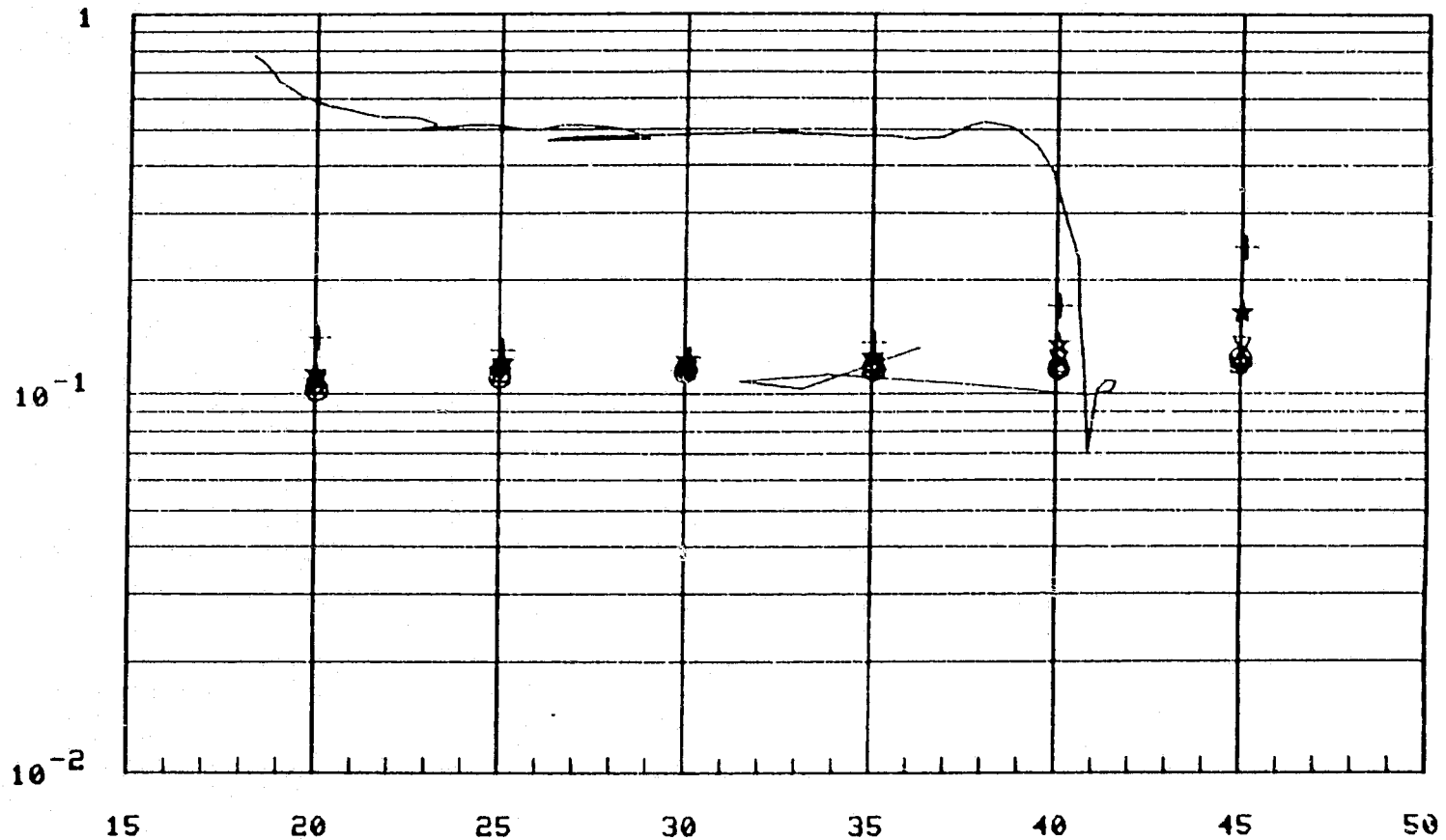
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.28

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U07T9668A/H-REF 965-1300 SEC

LIFT COEFF - I/I-REF



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ANGLE-OF-ATTACK - DEG

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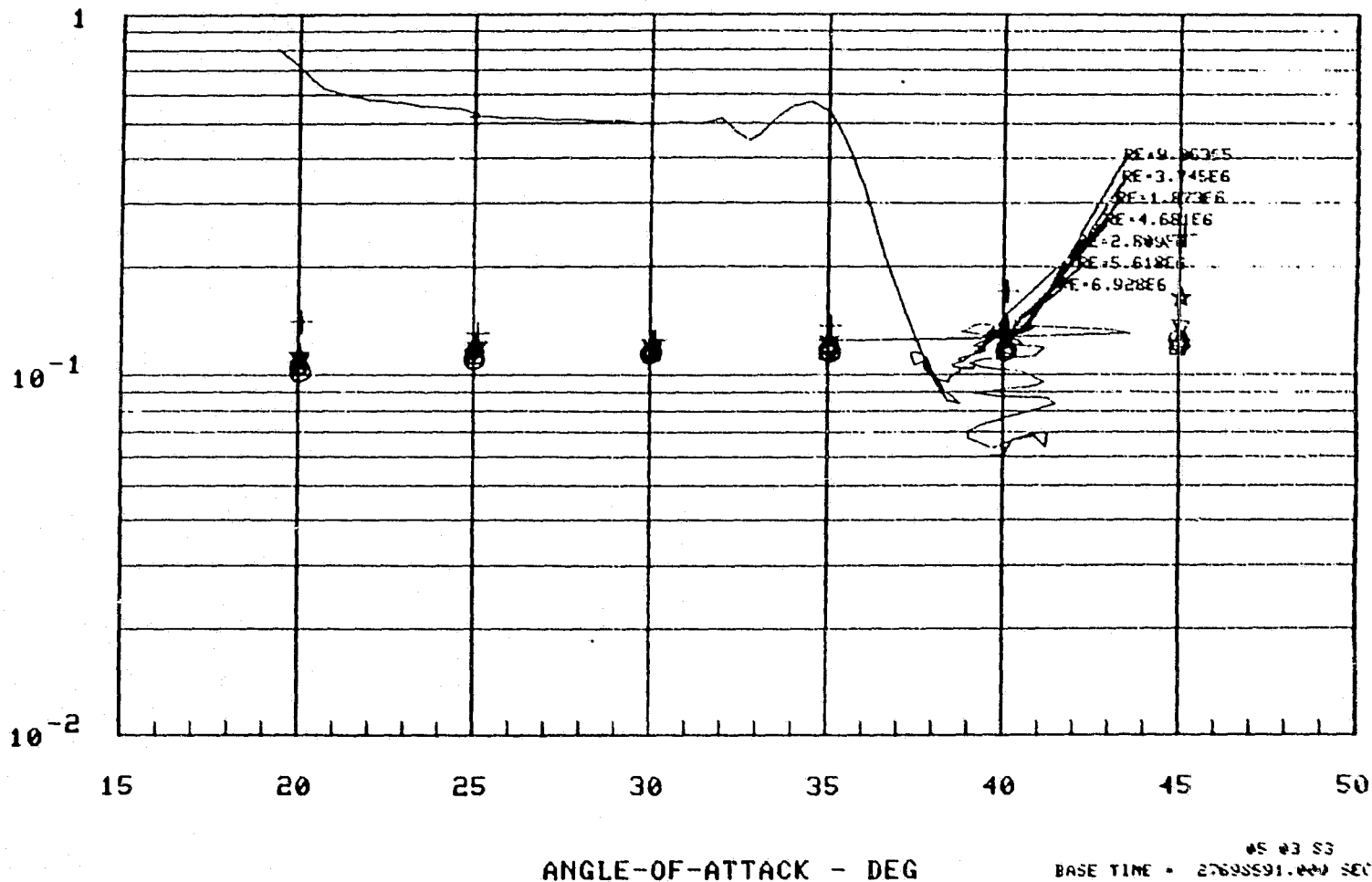
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U07T9668A/H-REF 150-1350 SEC

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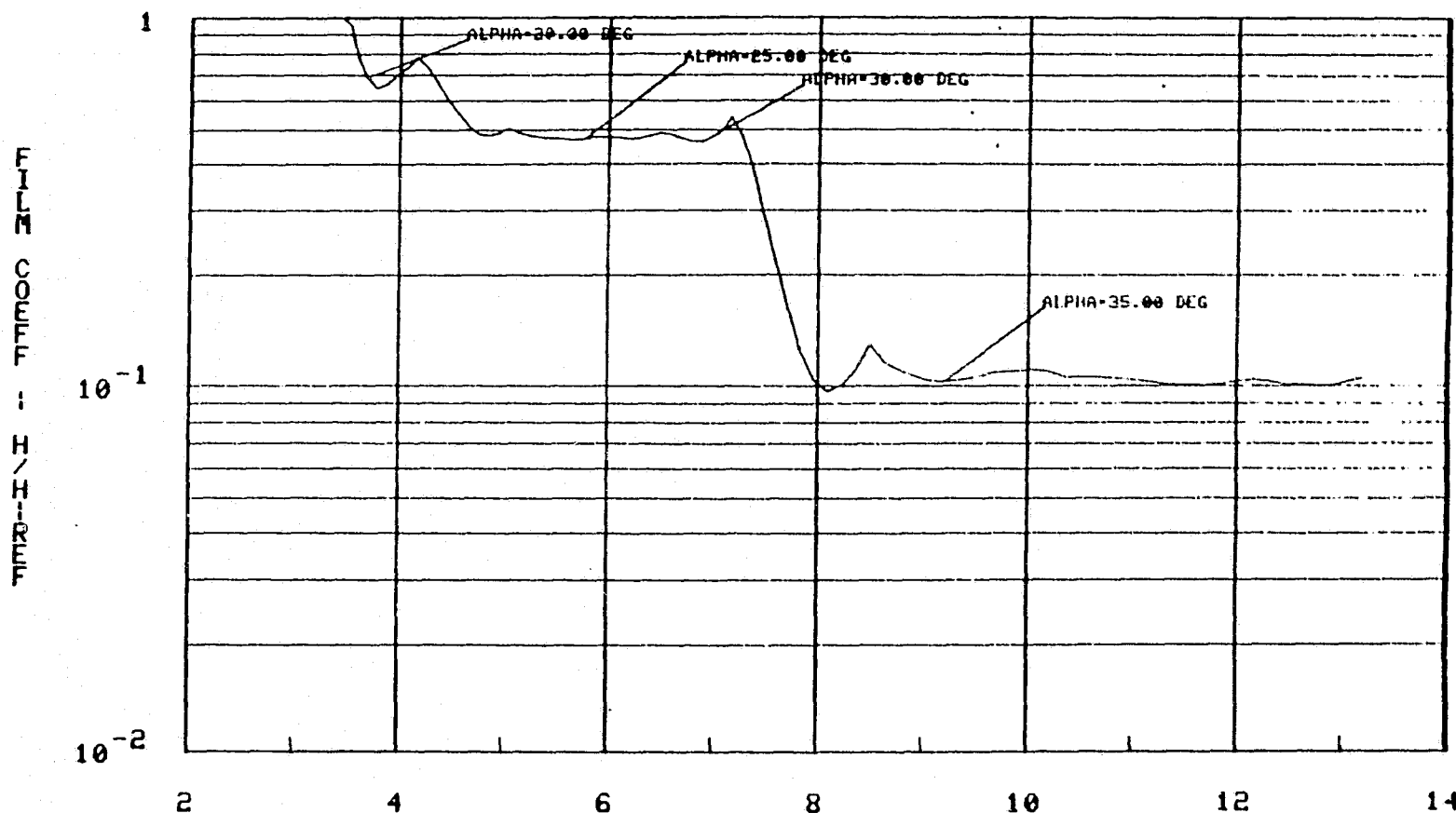
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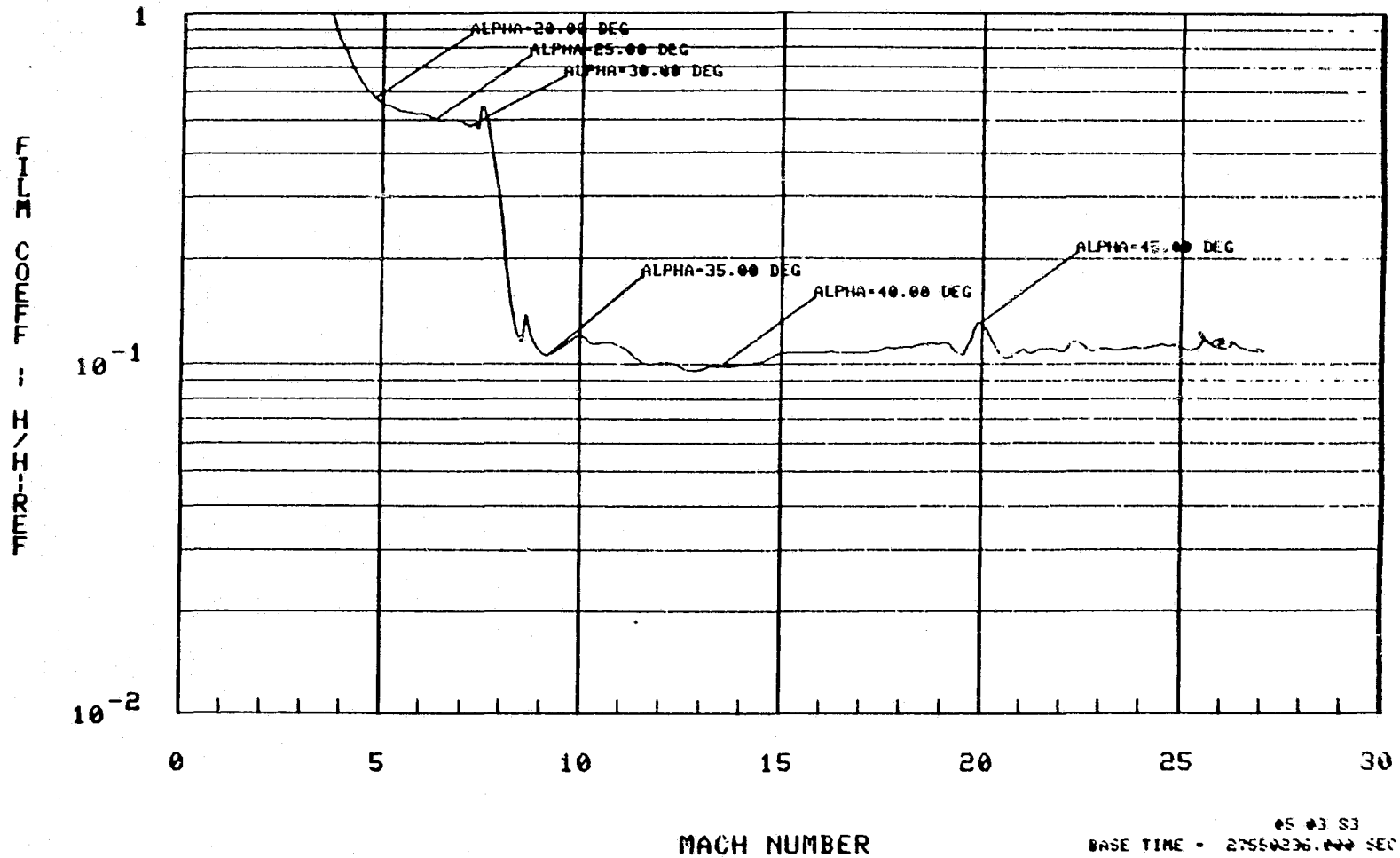
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U07T9668A/H-REF 200-1480 SEC

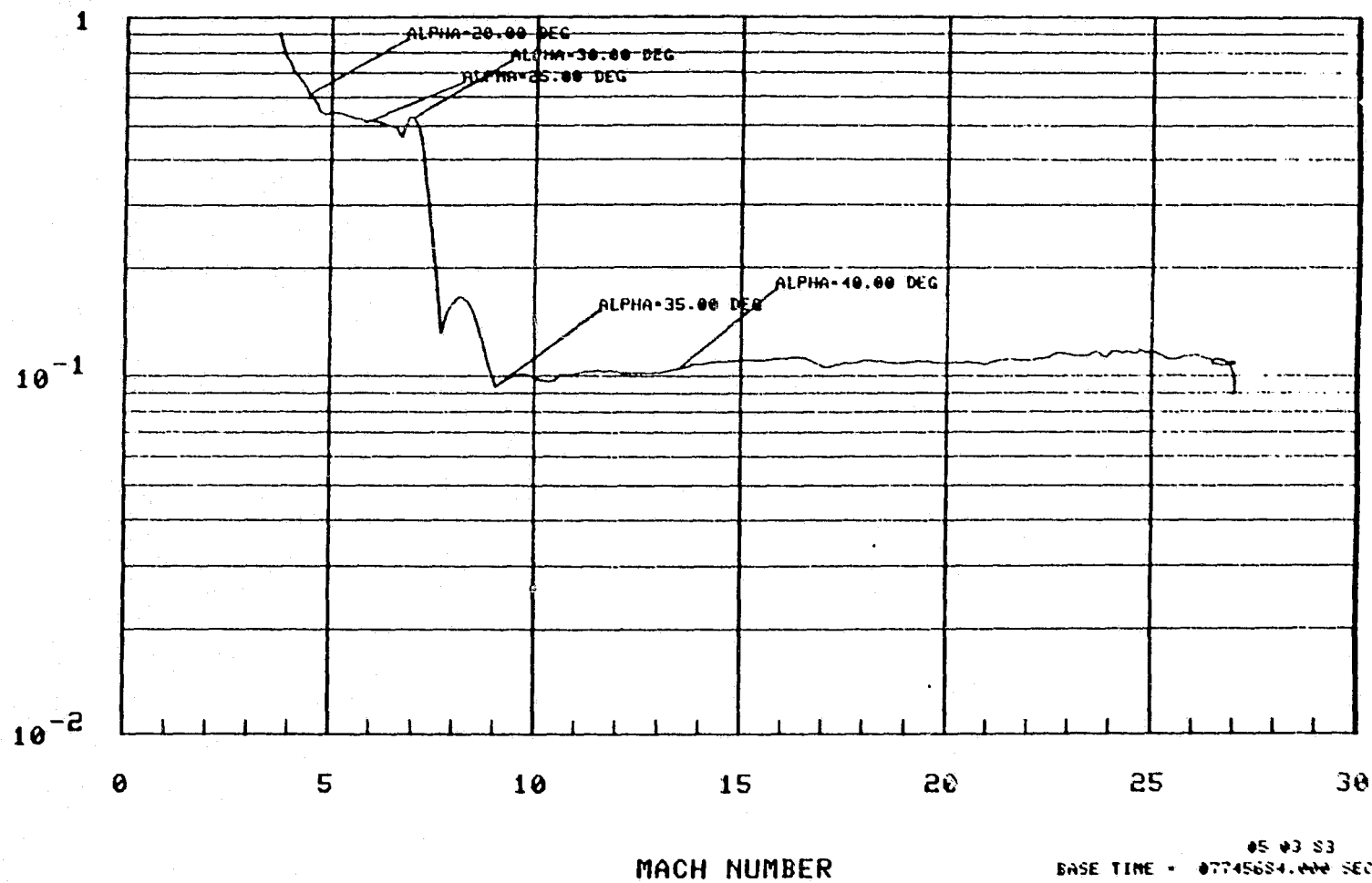


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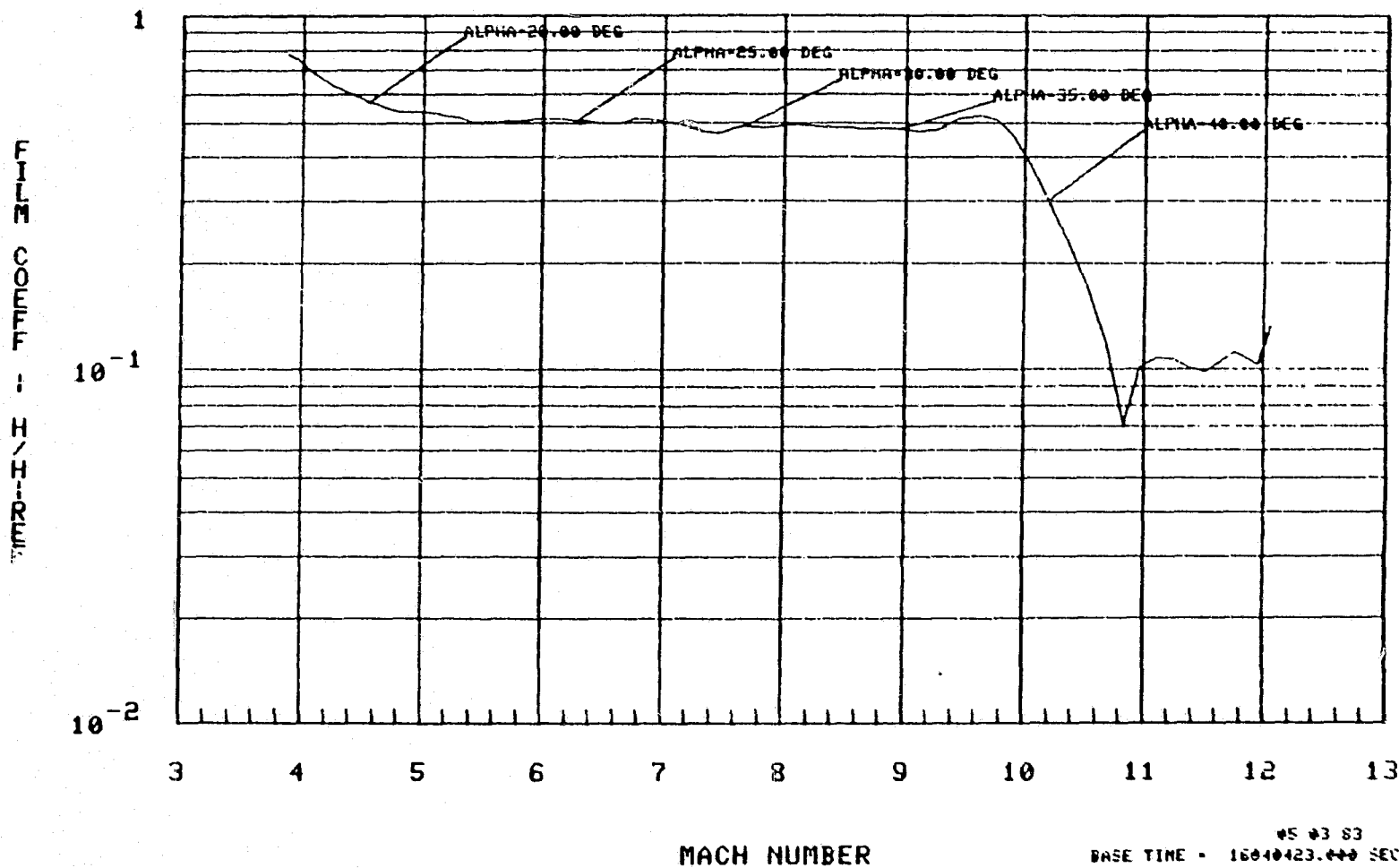
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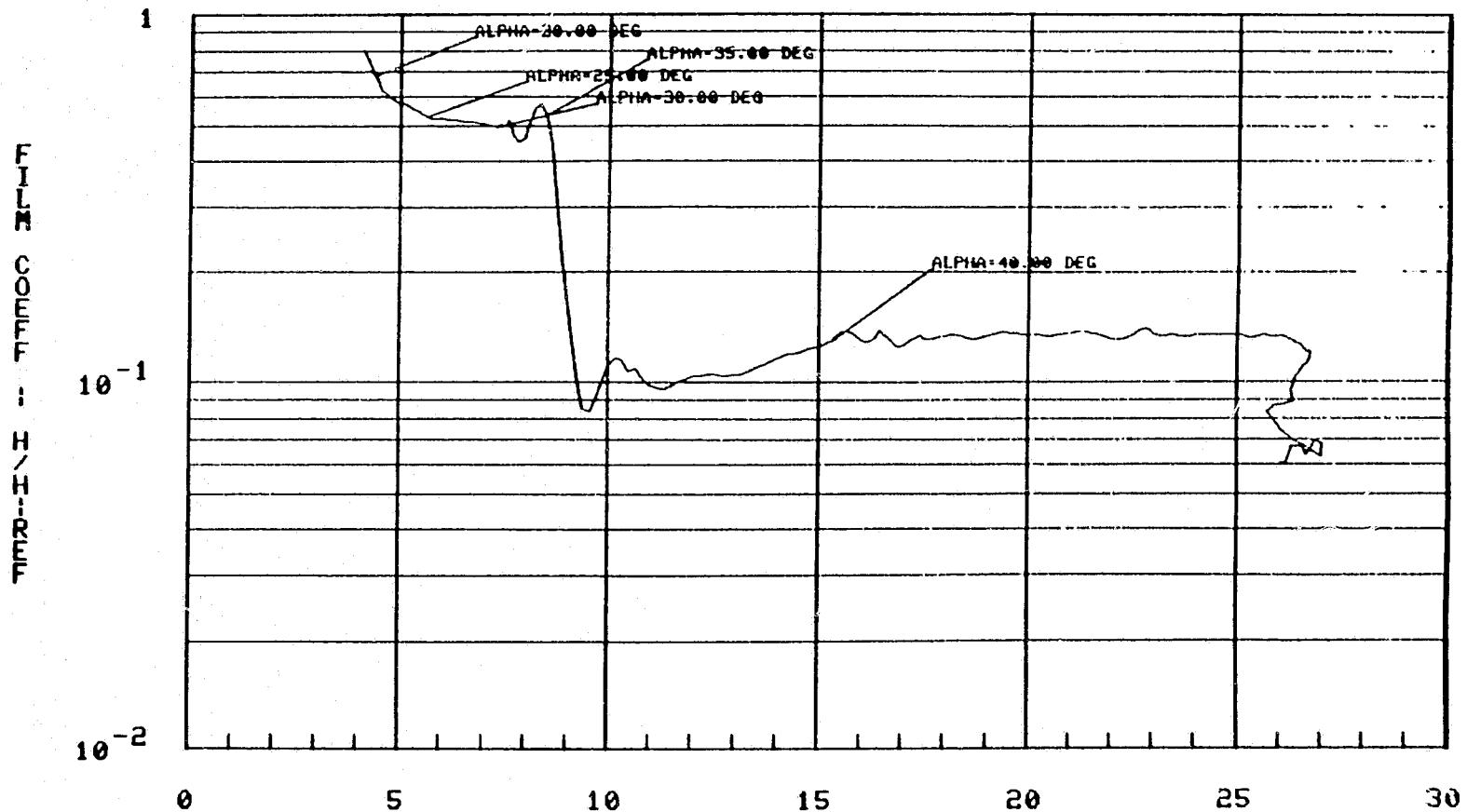
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STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9668A/H-REF 150-1350 SEC



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B-35

MACH NUMBER

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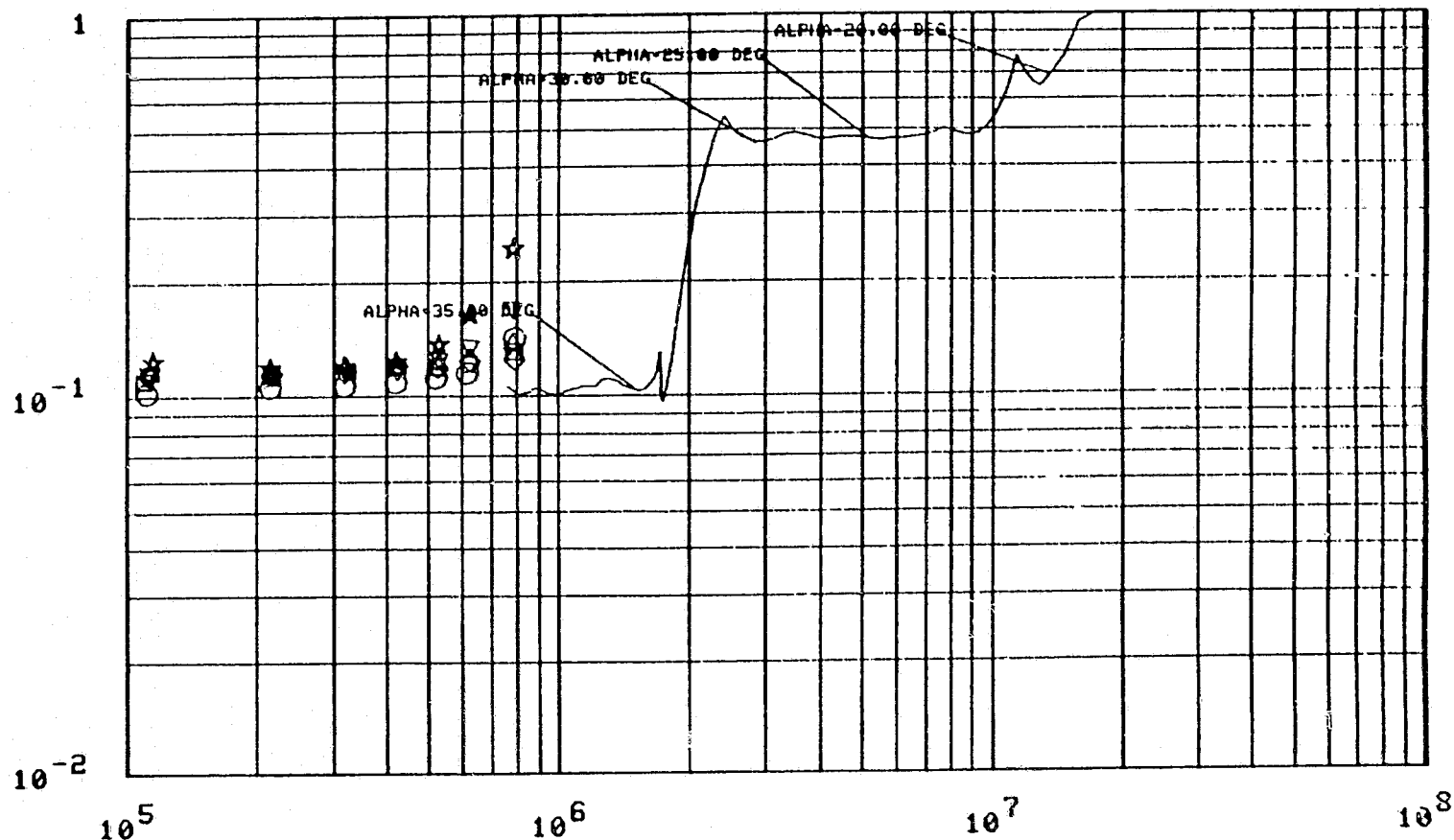
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U07T9668A/H-REF 1065-1460 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

FILE CODE - H-H-REF



REYNOLDS NUMBER (NS)

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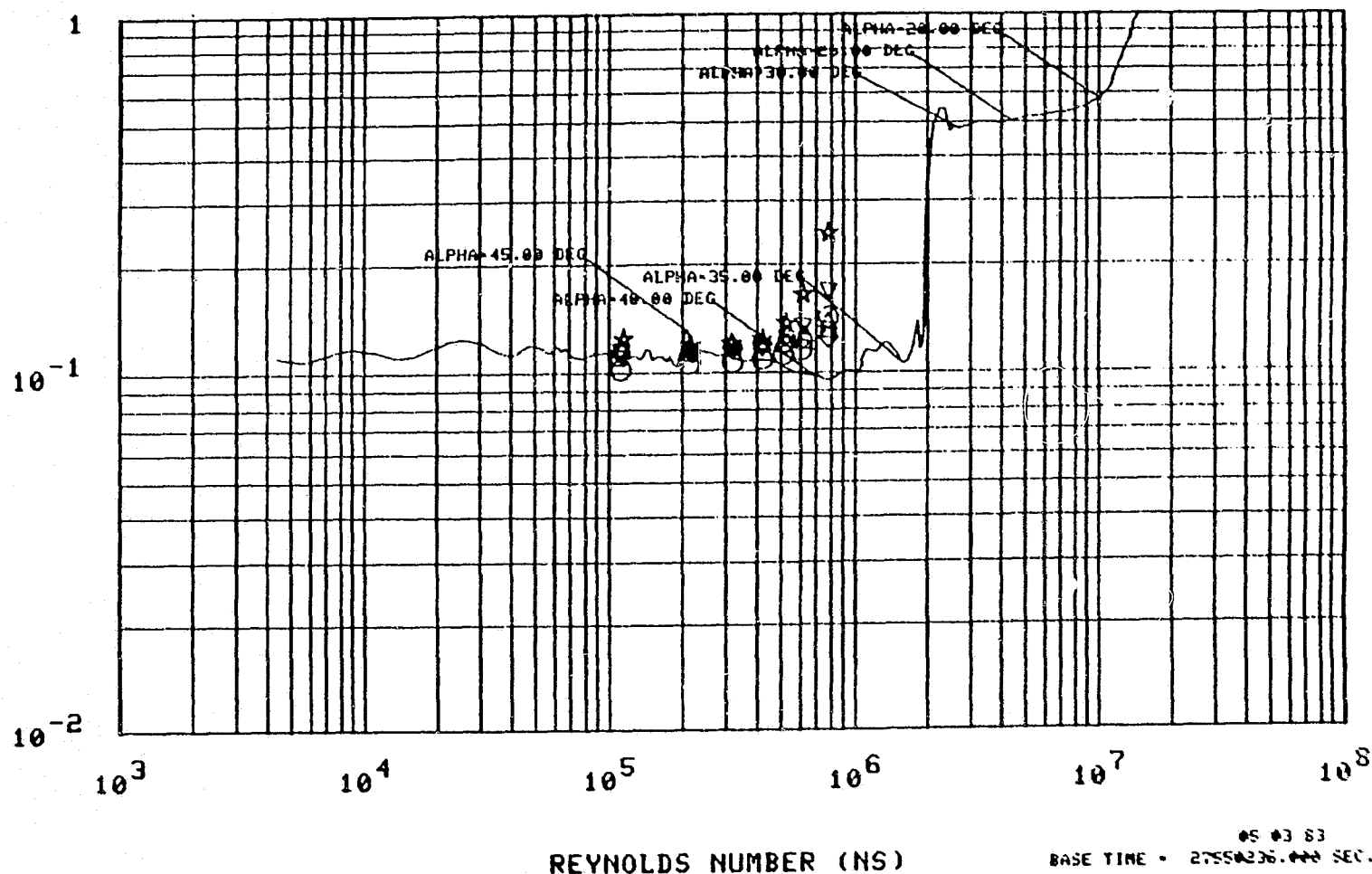
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9668A/H-REF 200-1480 SEC

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B-37



STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

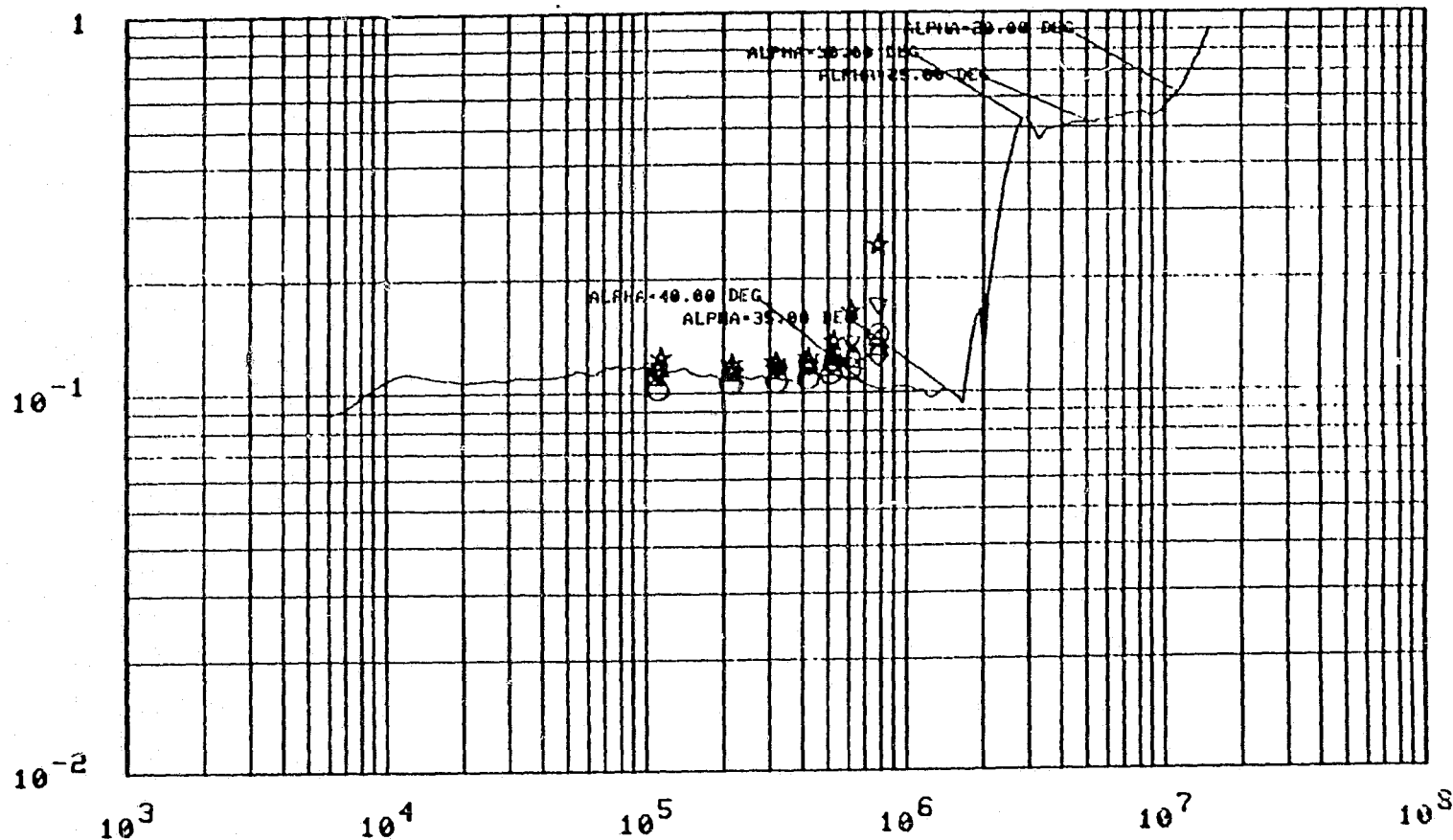
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9668A/H-REF 200-1380 SEC

LINE CODE : H/H-KILL

B-38



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REYNOLDS NUMBER (NS)

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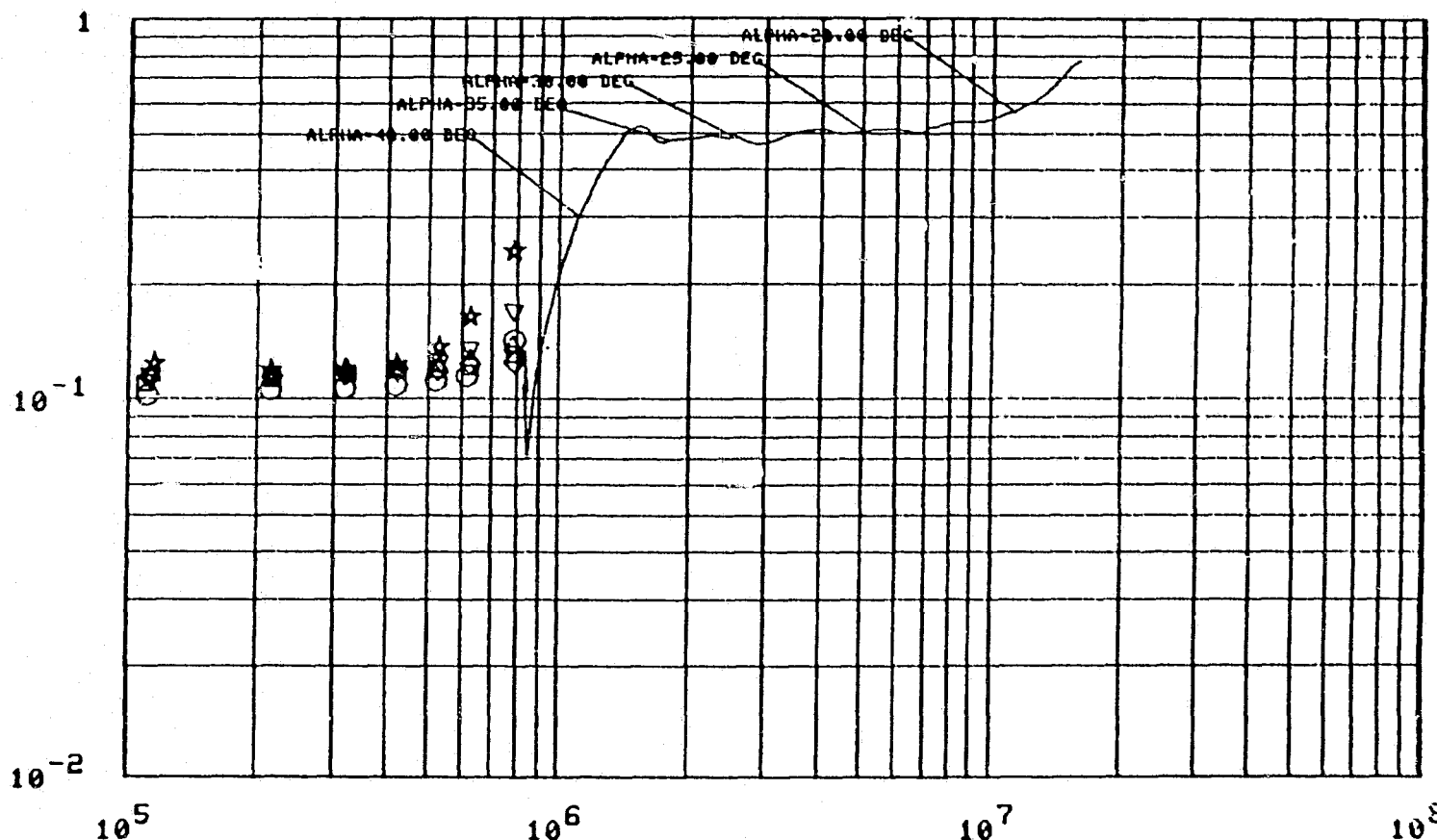
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.28

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9668A/H-REF 965-1300 SEC

LINE COUNT - I/I-RUL



CRITICAL REYNOLDS
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REYNOLDS NUMBER (NS)

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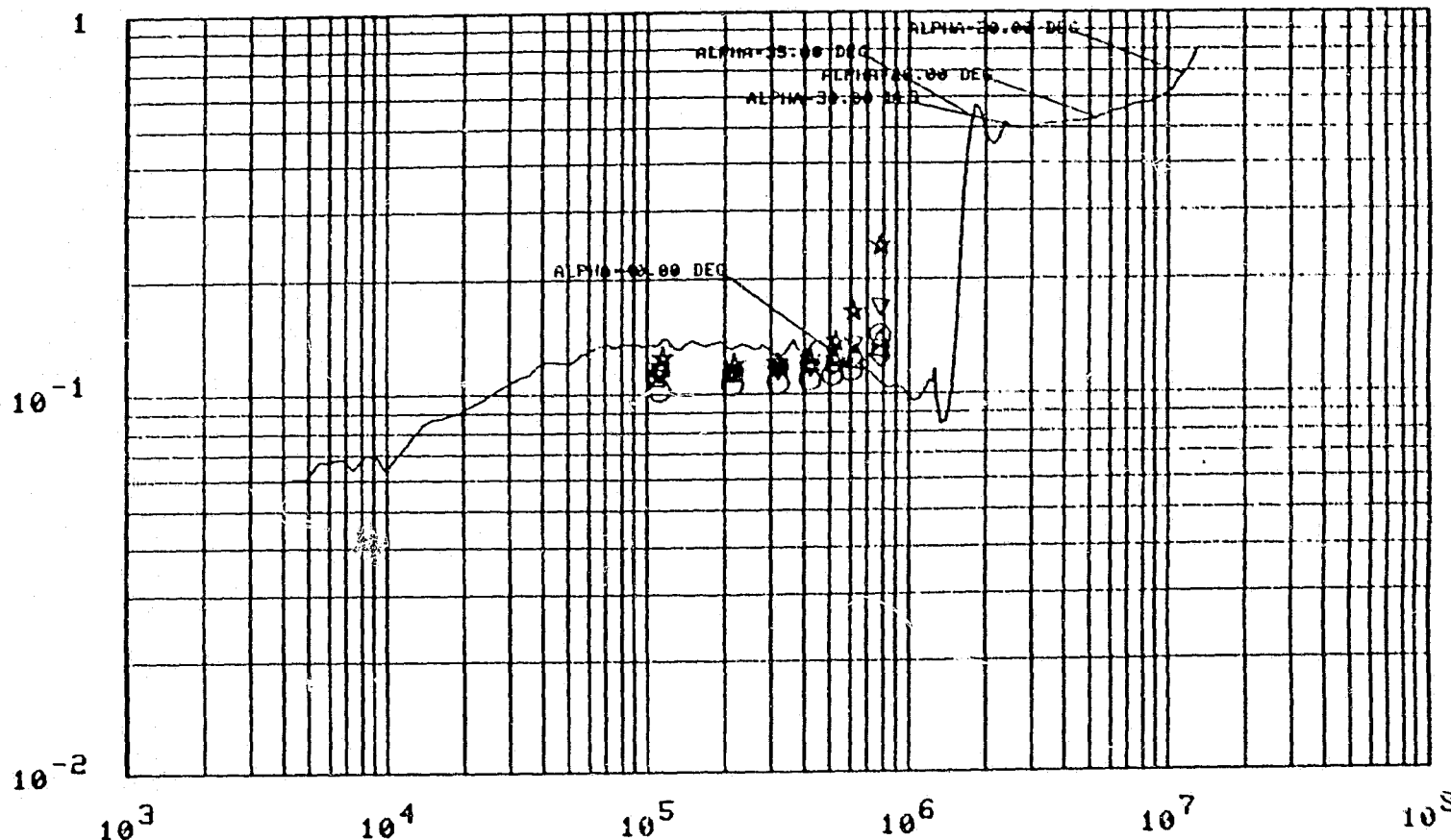
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OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
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U07T9668A/H-REF 150-1350 SEC

FILM COULDS - H-H-REF



REYNOLDS NUMBER (NS)

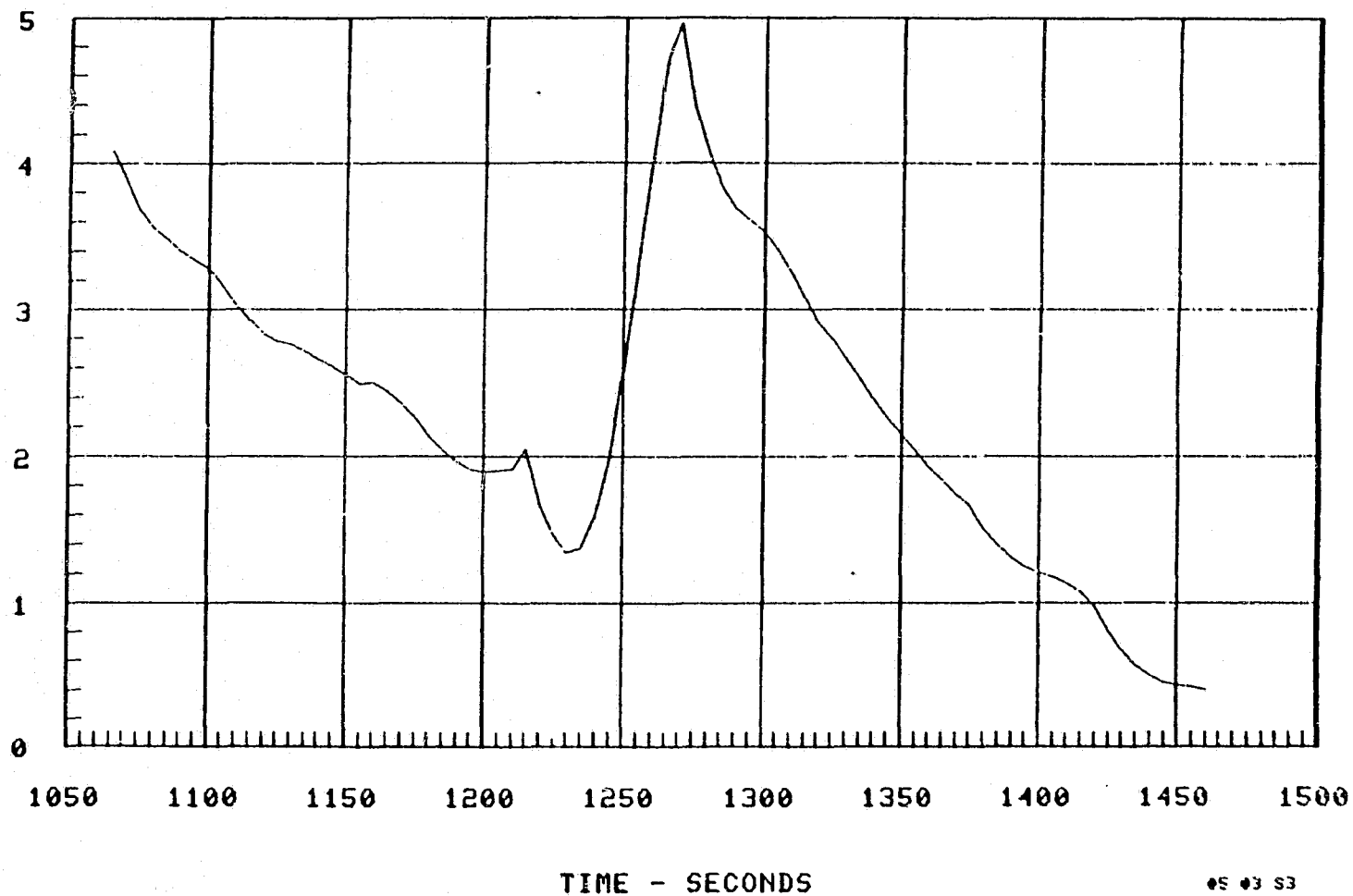
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U07T9668A

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B-47

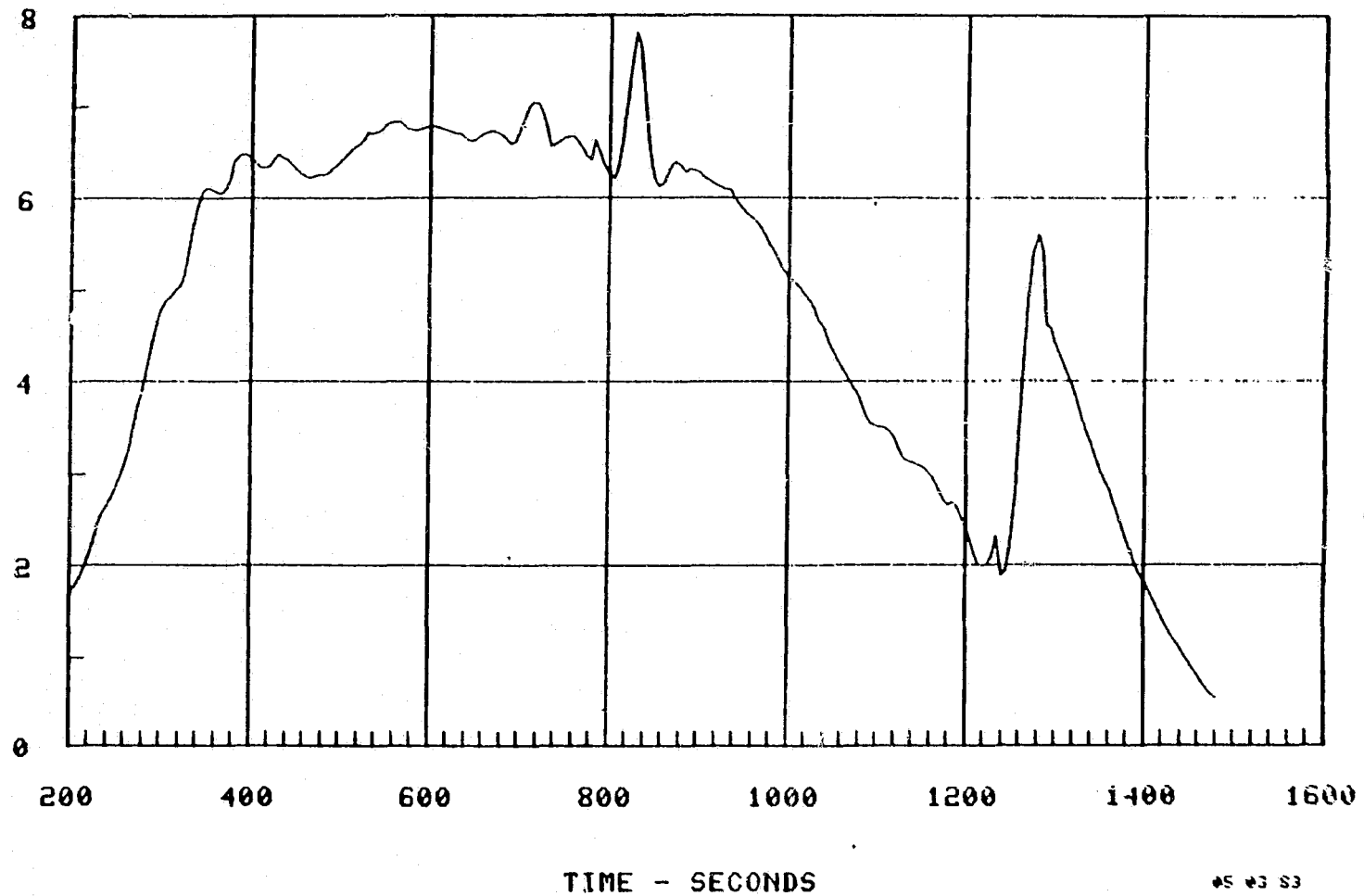
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U0719668A

ENGINEING REPLY -- B-42 -- 0000

B-42



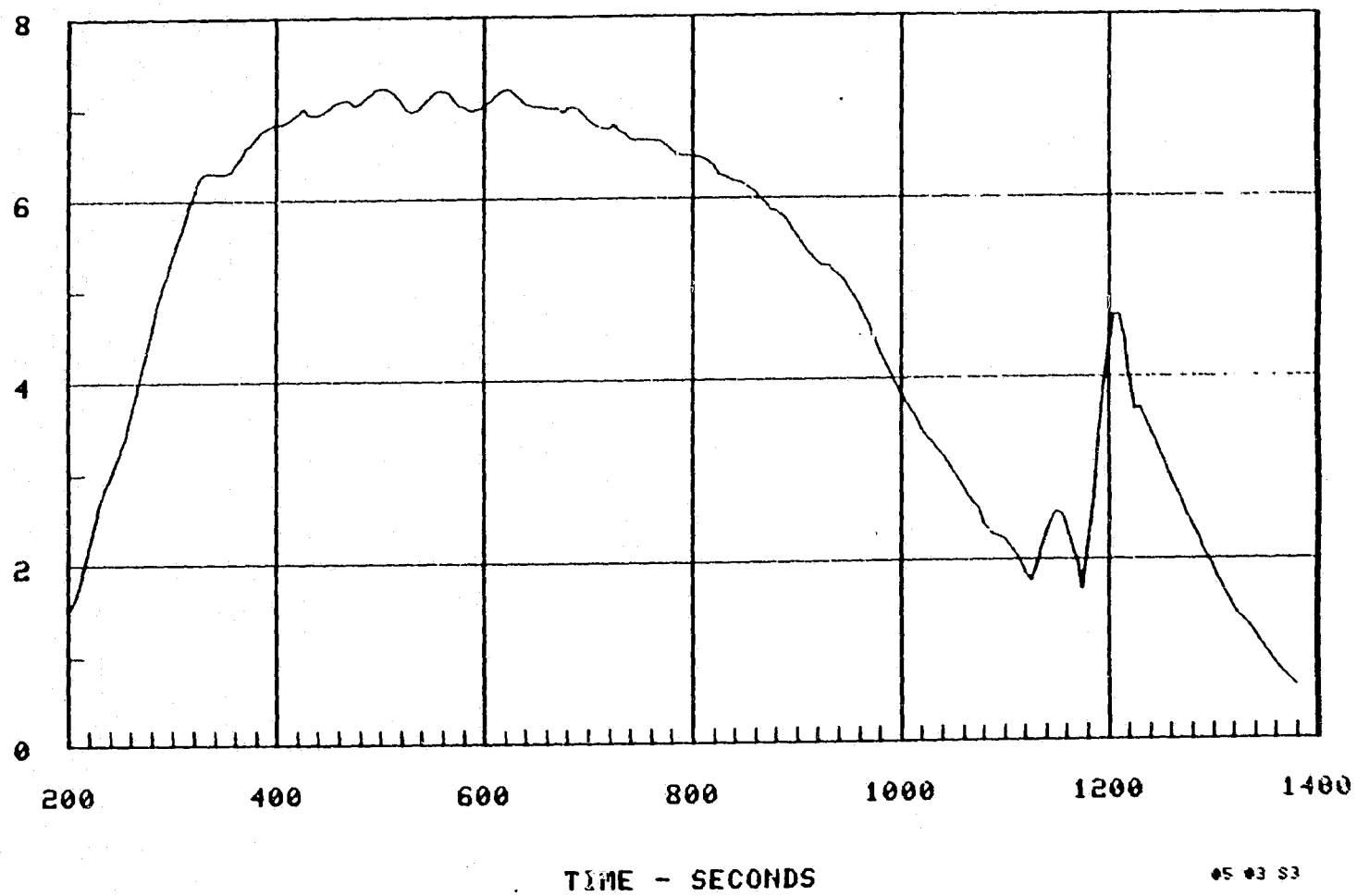
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STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9662A

HEATING RATE : BTU/FT**2 : SEC

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B-43

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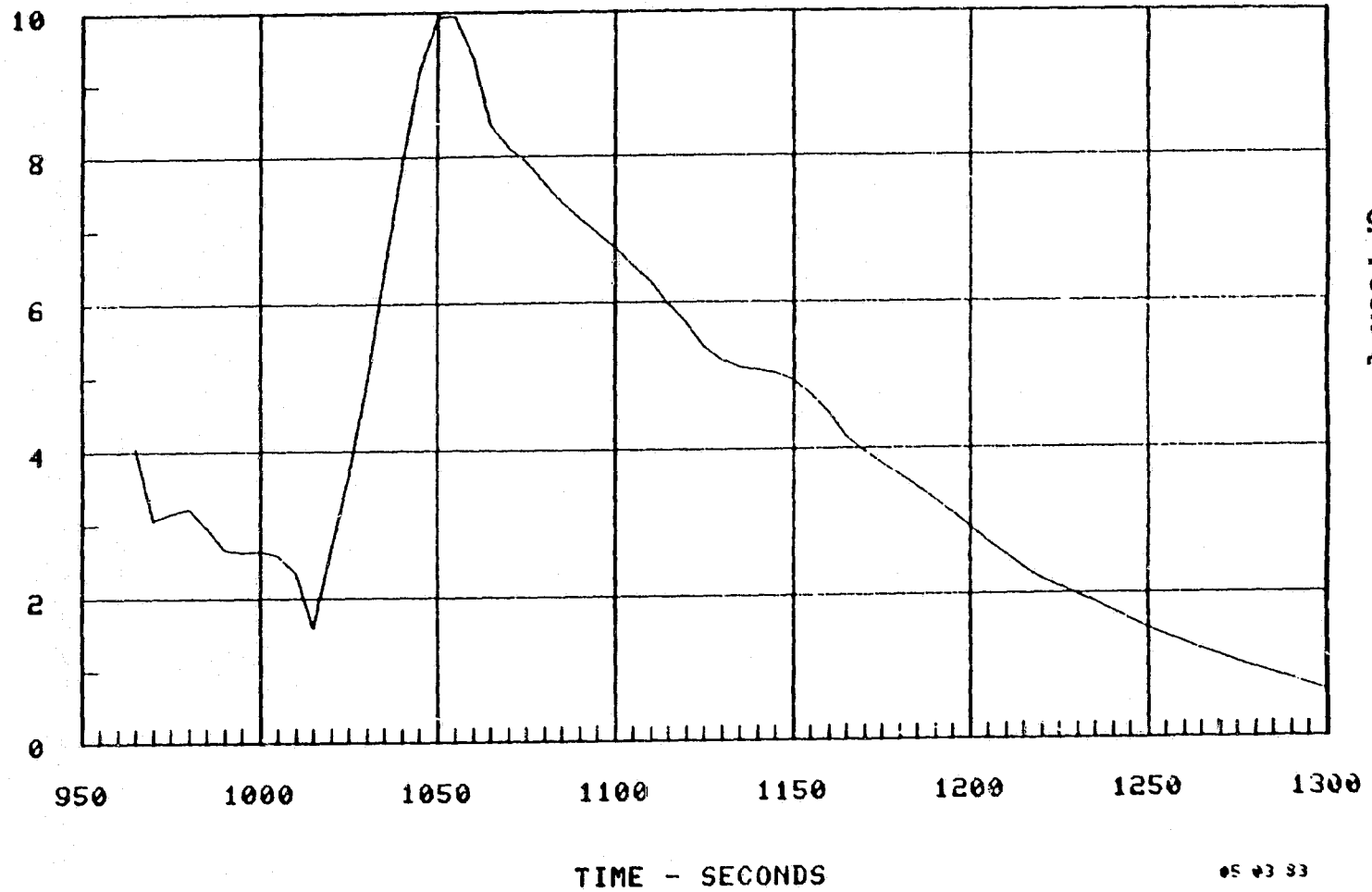
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U07T9668A

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B-44

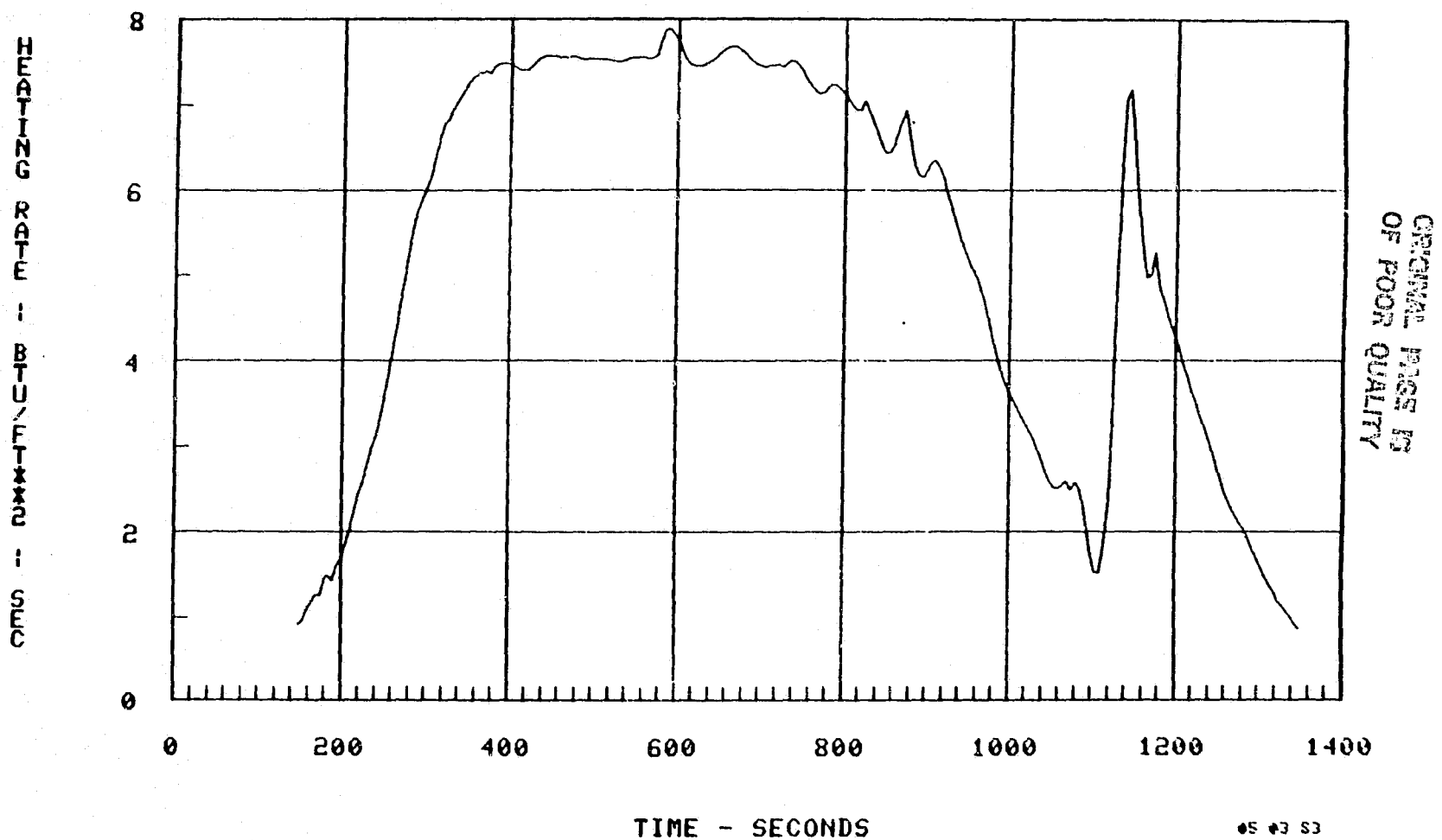
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05 43 33

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9668A

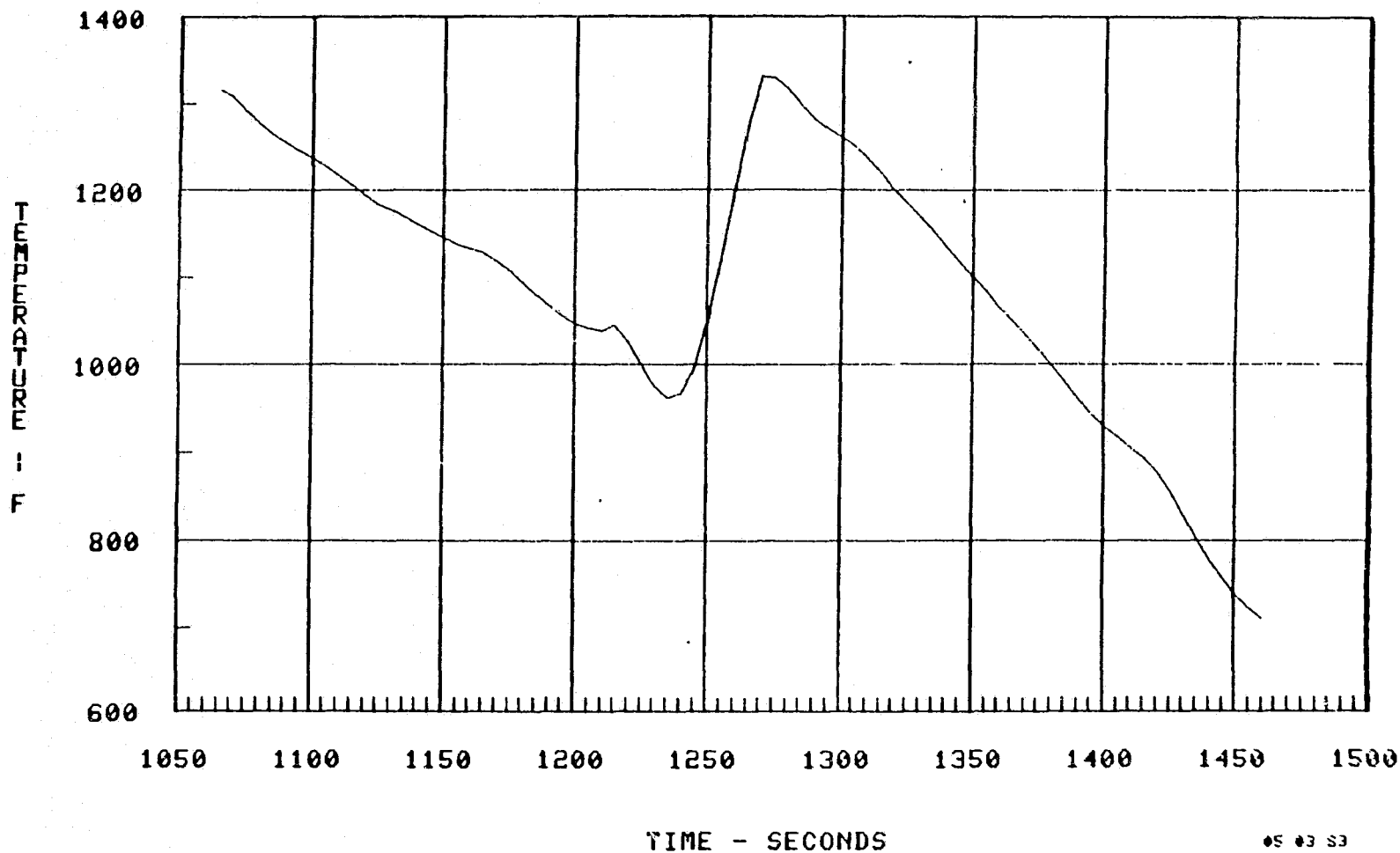


B-45

05 43 S3

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9668A

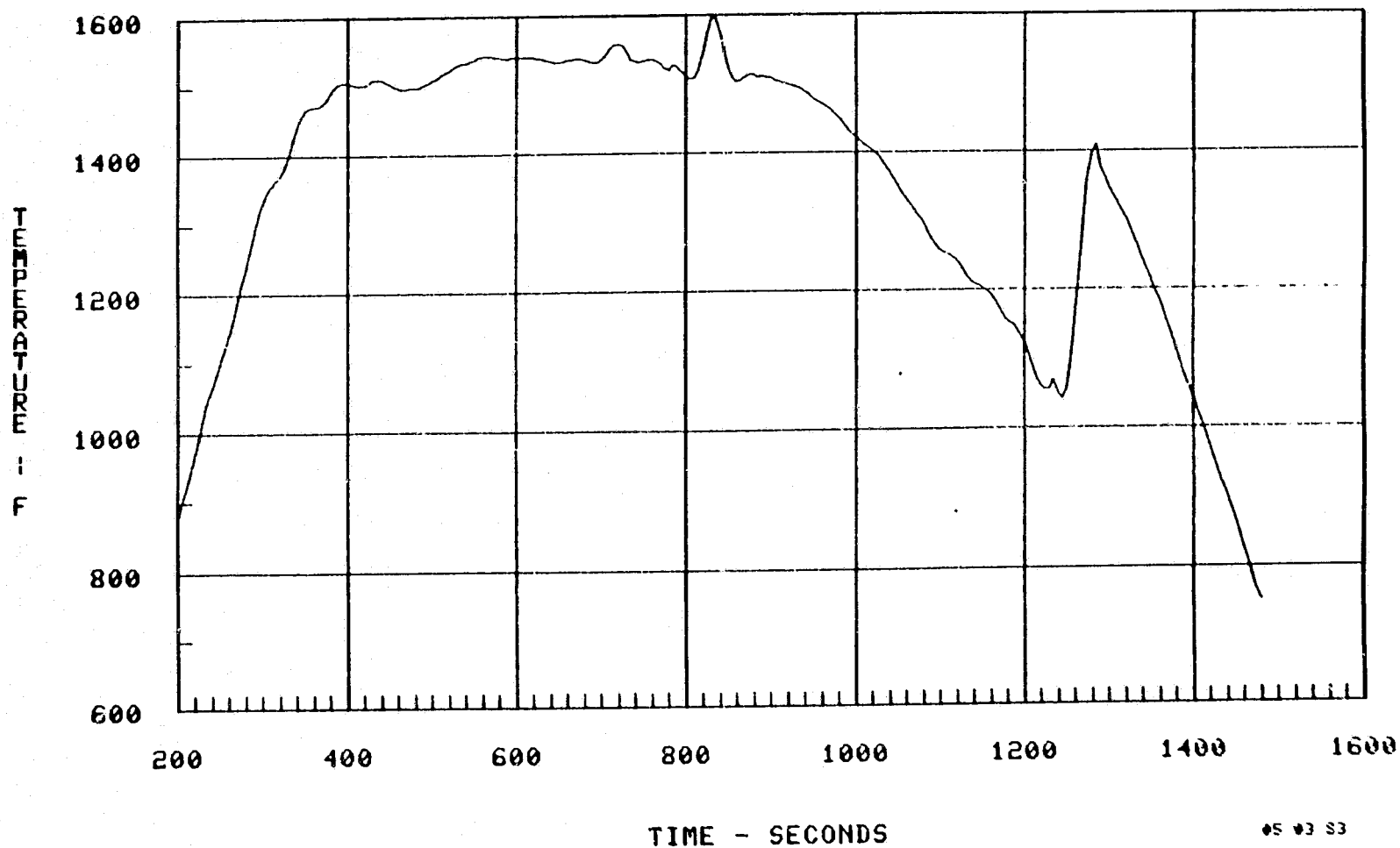


05 03 53

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OF POOR QUALITY

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9668A



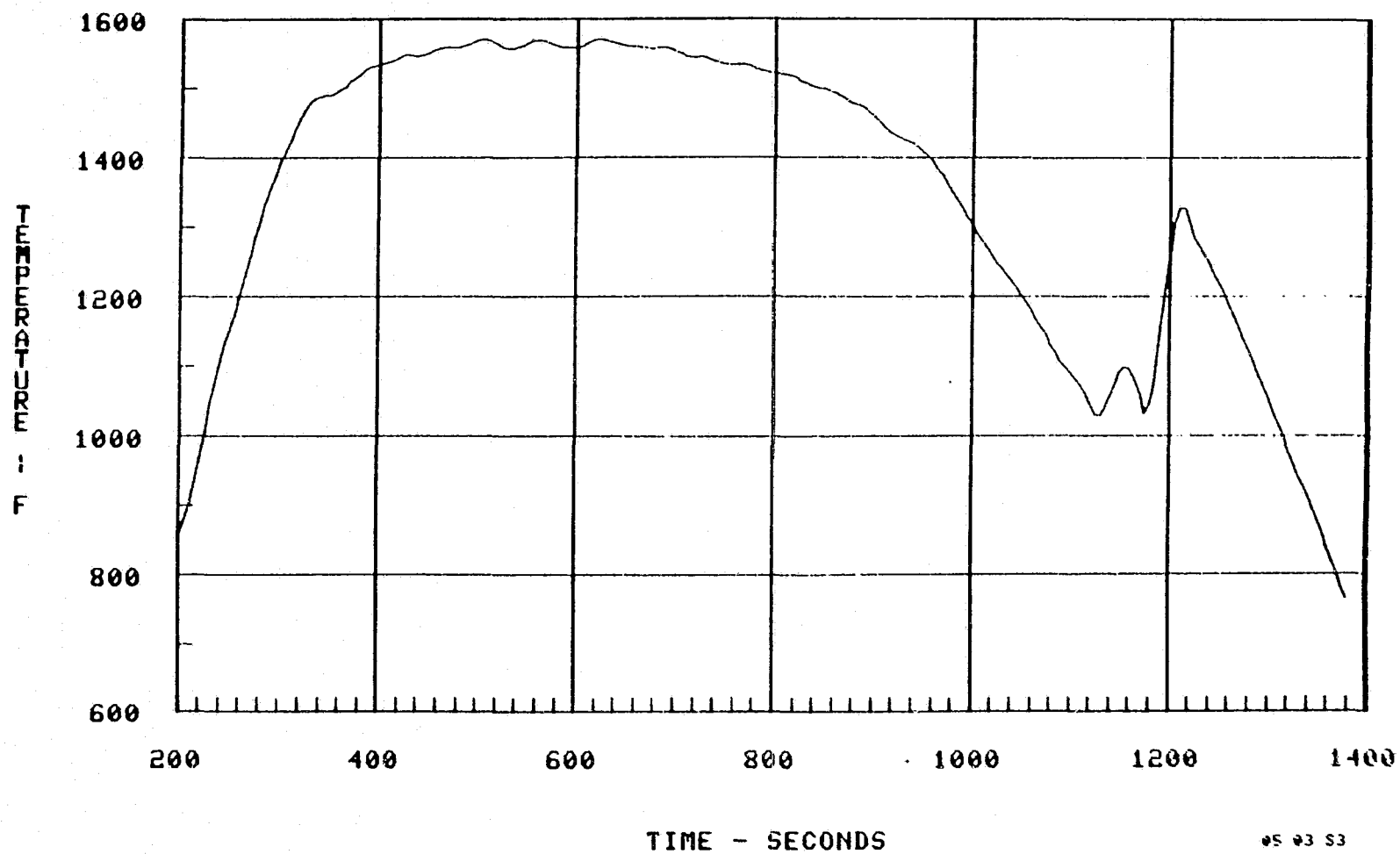
ORIGINAL COPY
OF FUEL WEIGHT

B-47

05 03 53

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9668A



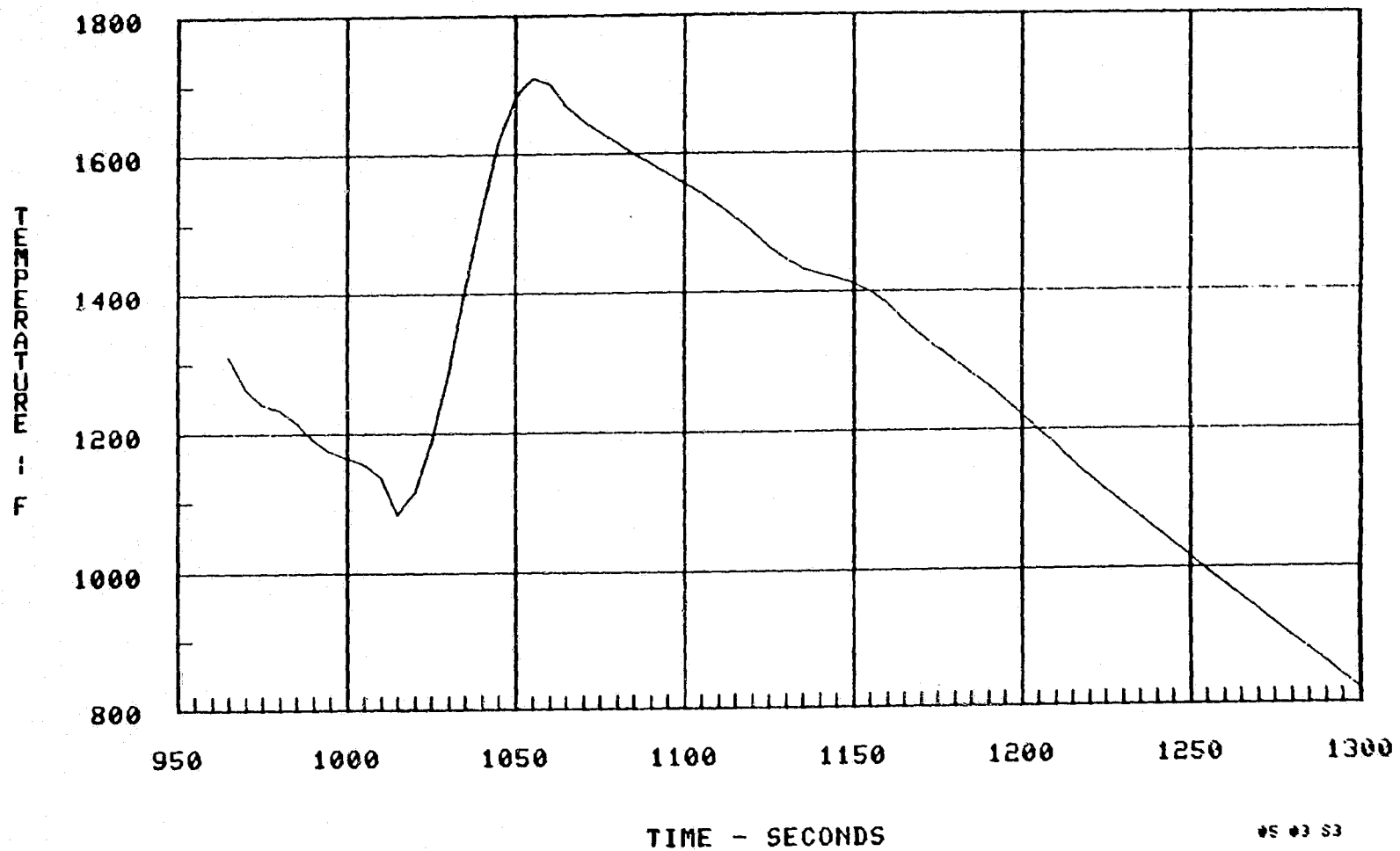
ORIGINAL PAGE IS
OF POOR QUALITY

05 03 53

B-48

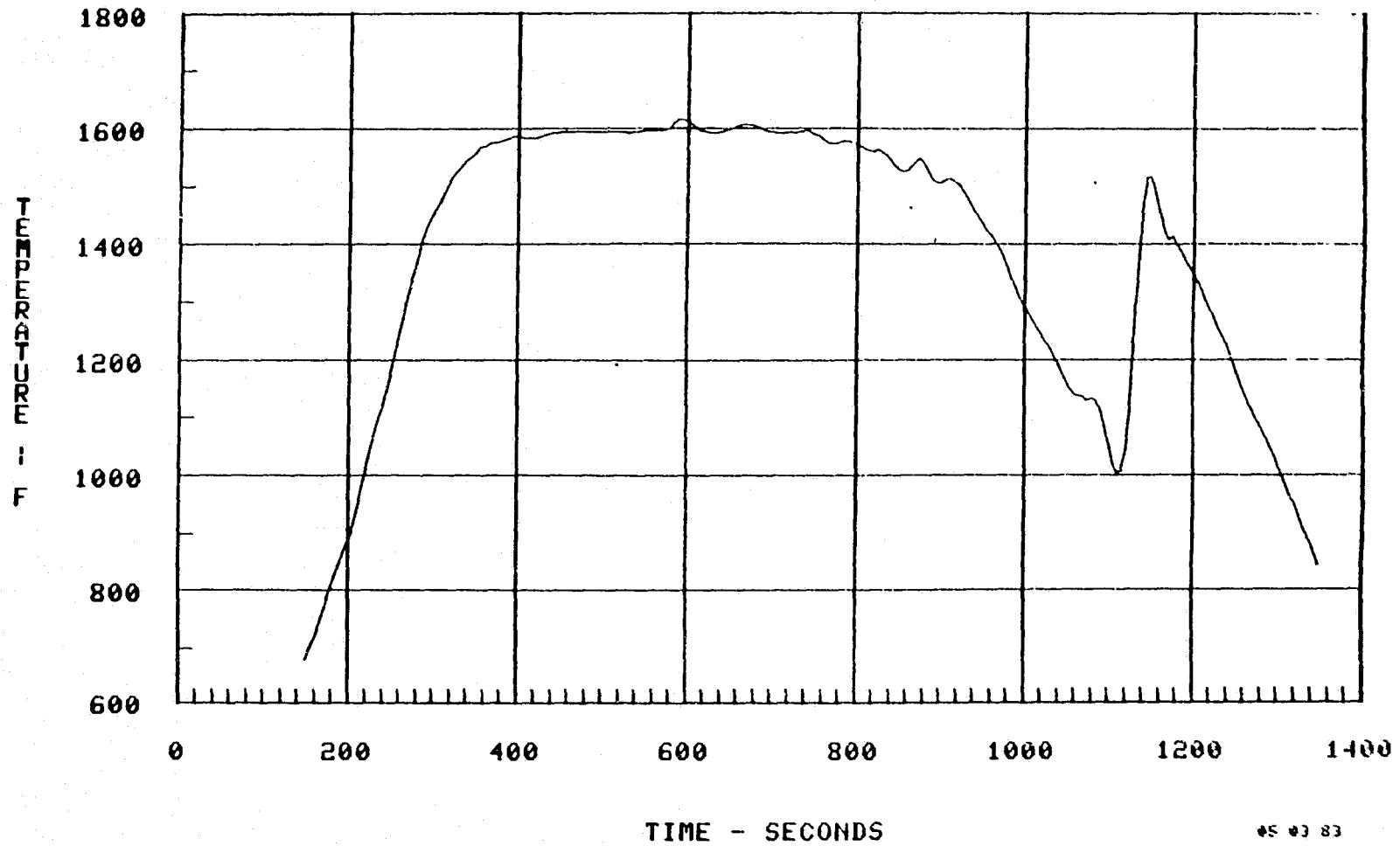
STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.28$

U07T9668A



STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.28

U07T9668A



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OF POOR QUALITY

B-50

05 03 83

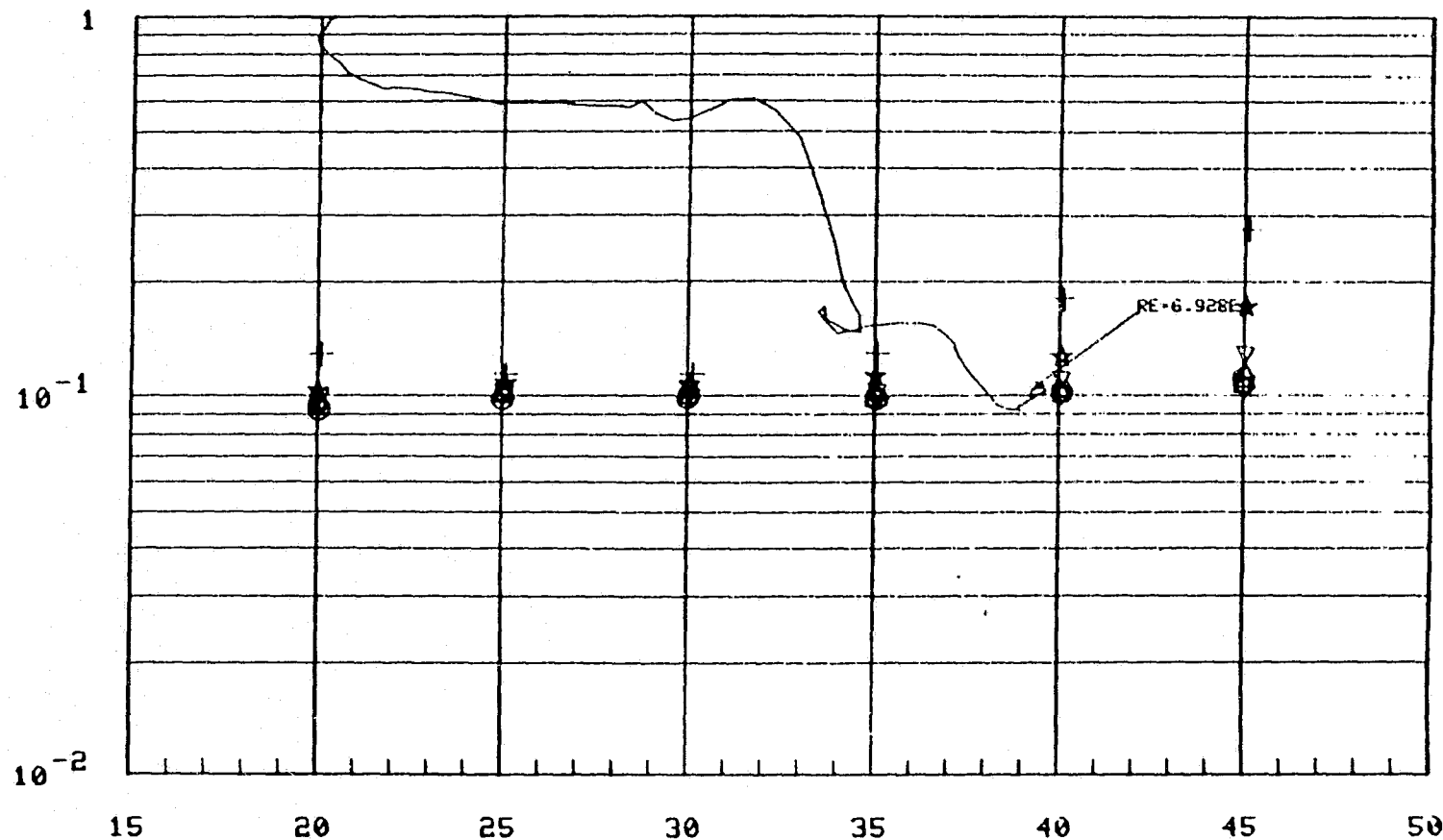
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.36

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9171A/H-REF 1065-1460 SEC

FILE COWELL - H/H-REF



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ANGLE-OF-ATTACK - DEG

05 03 33
BASE TIME = 09049744.000 SEC.

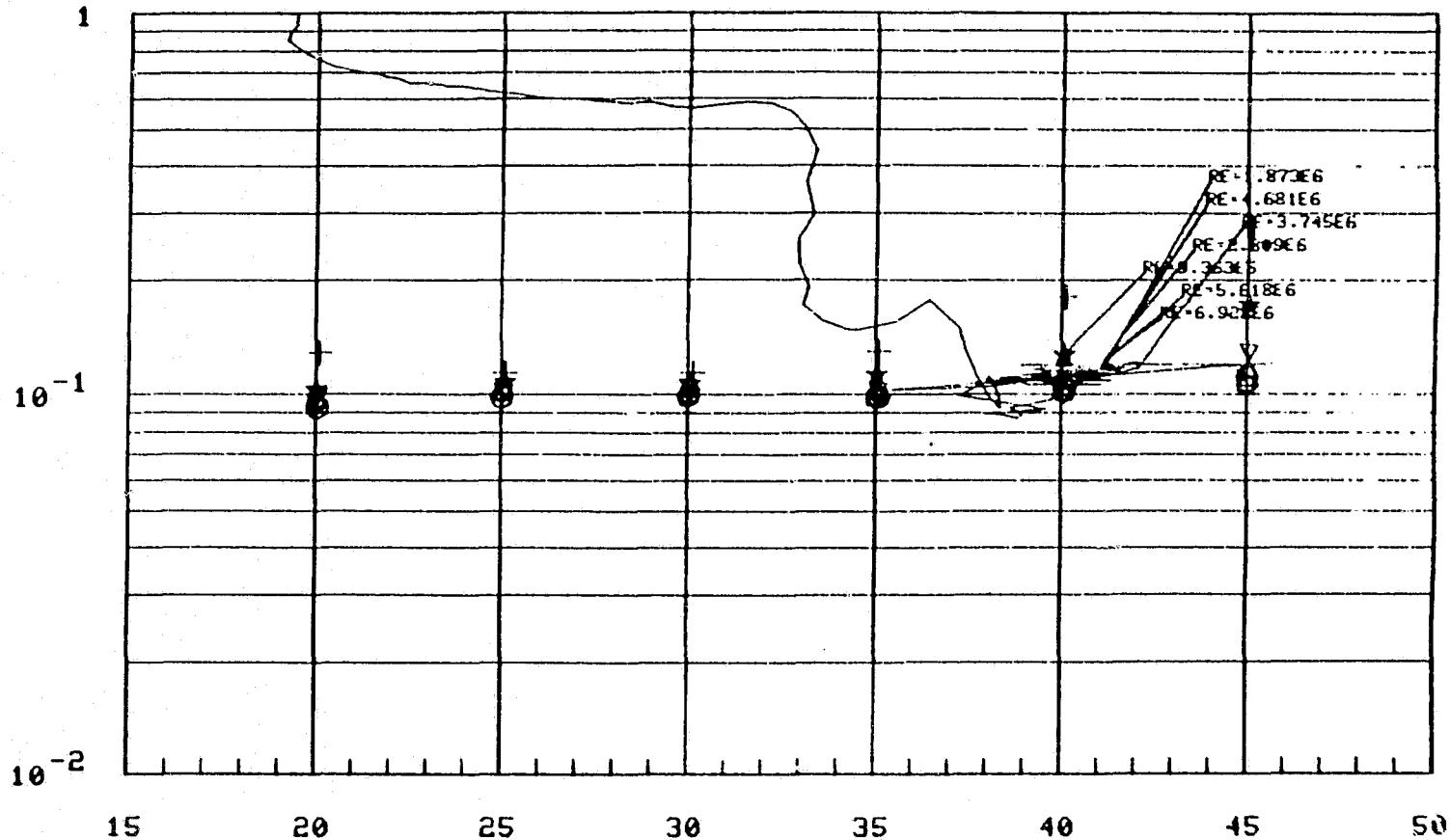
STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.36

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9171A/H-REF 200-1480 SEC

LINE COULD BE IN-RANGE



ORIGINAL PAGE IS
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

BASE TIME = 275502.36.000 SEC.

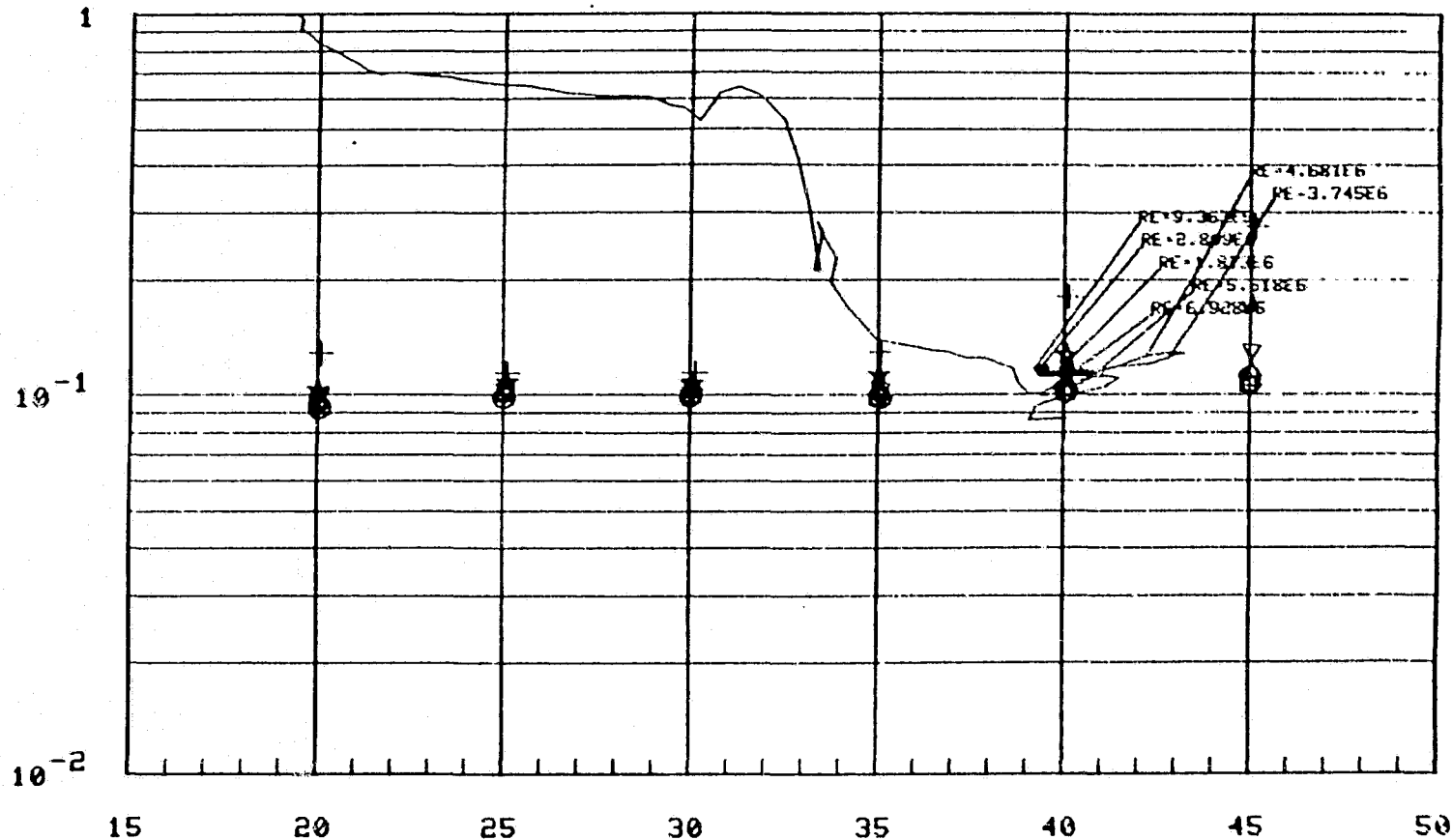
STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U09T9171A/H-REF 200-1380 SEC

FILE COMPLE - H/H-REF



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ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME - 07745634.000 SEC.

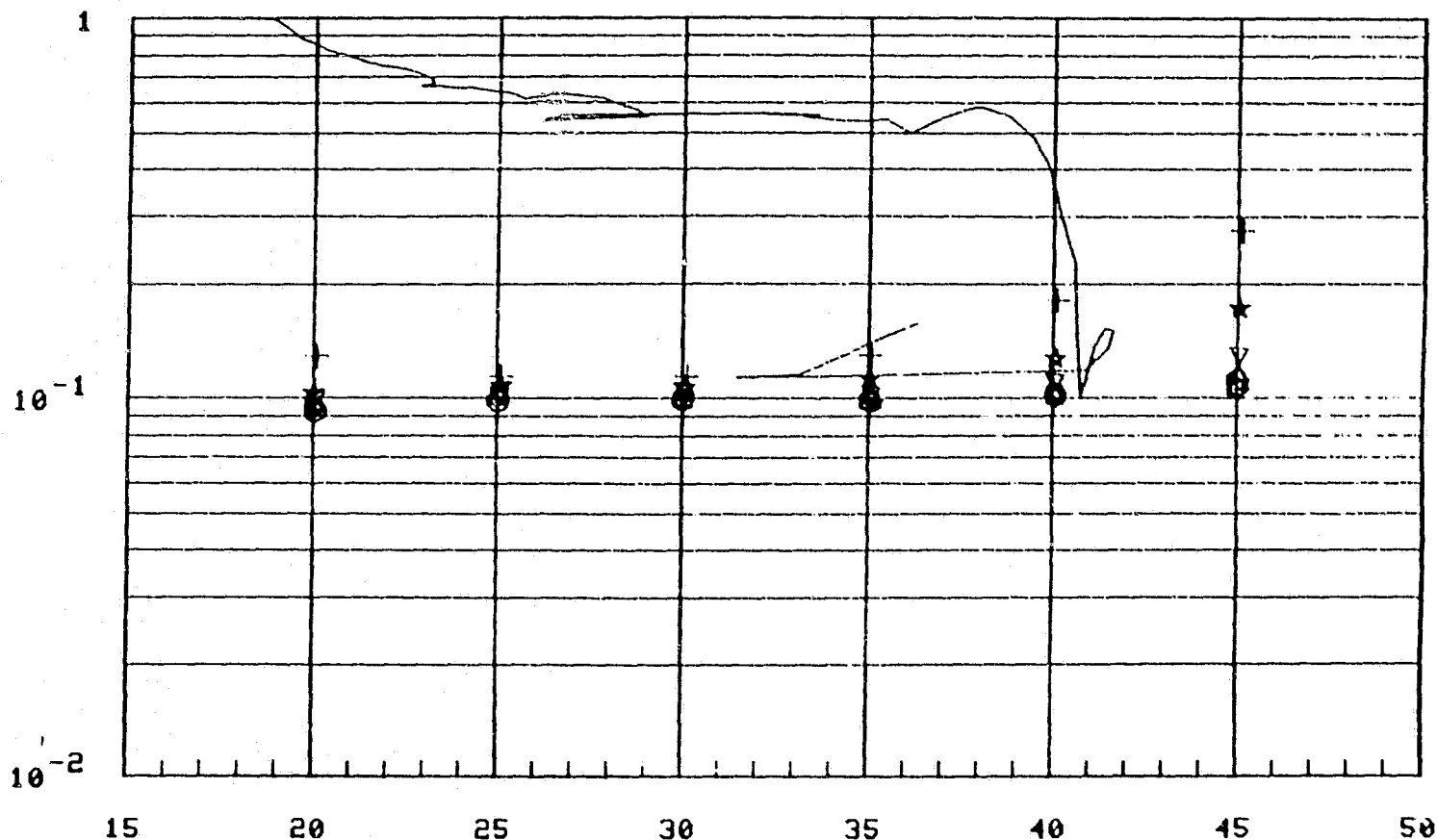
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.36

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9171A/H-REF 965-1300 SEC

FILE CODE - H/H-REF



B-54

ORIGINAL PAGE IS
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.36

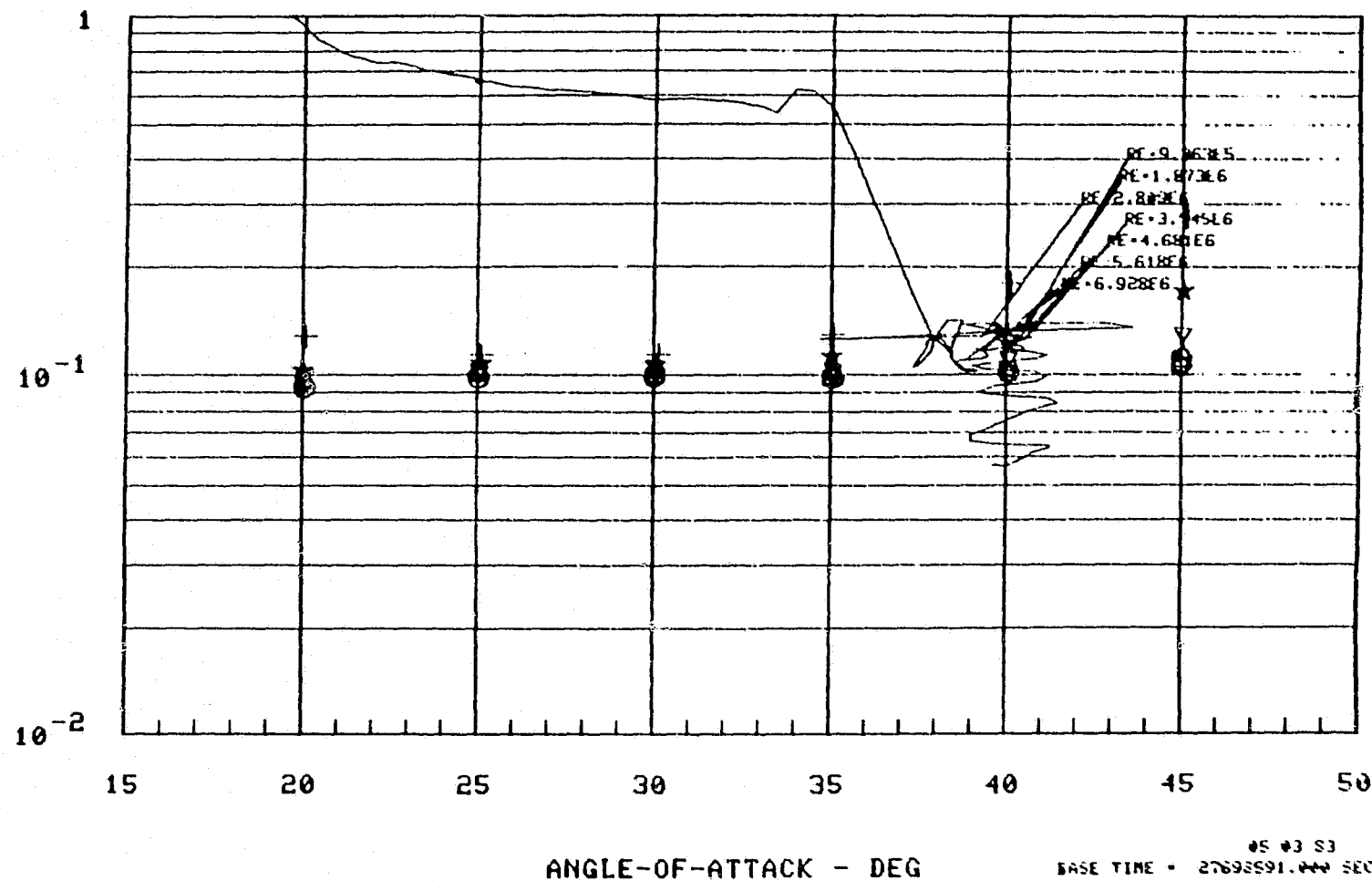
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9171A/H-REF 150-1350 SEC

FLIGHT COEFFICIENTS

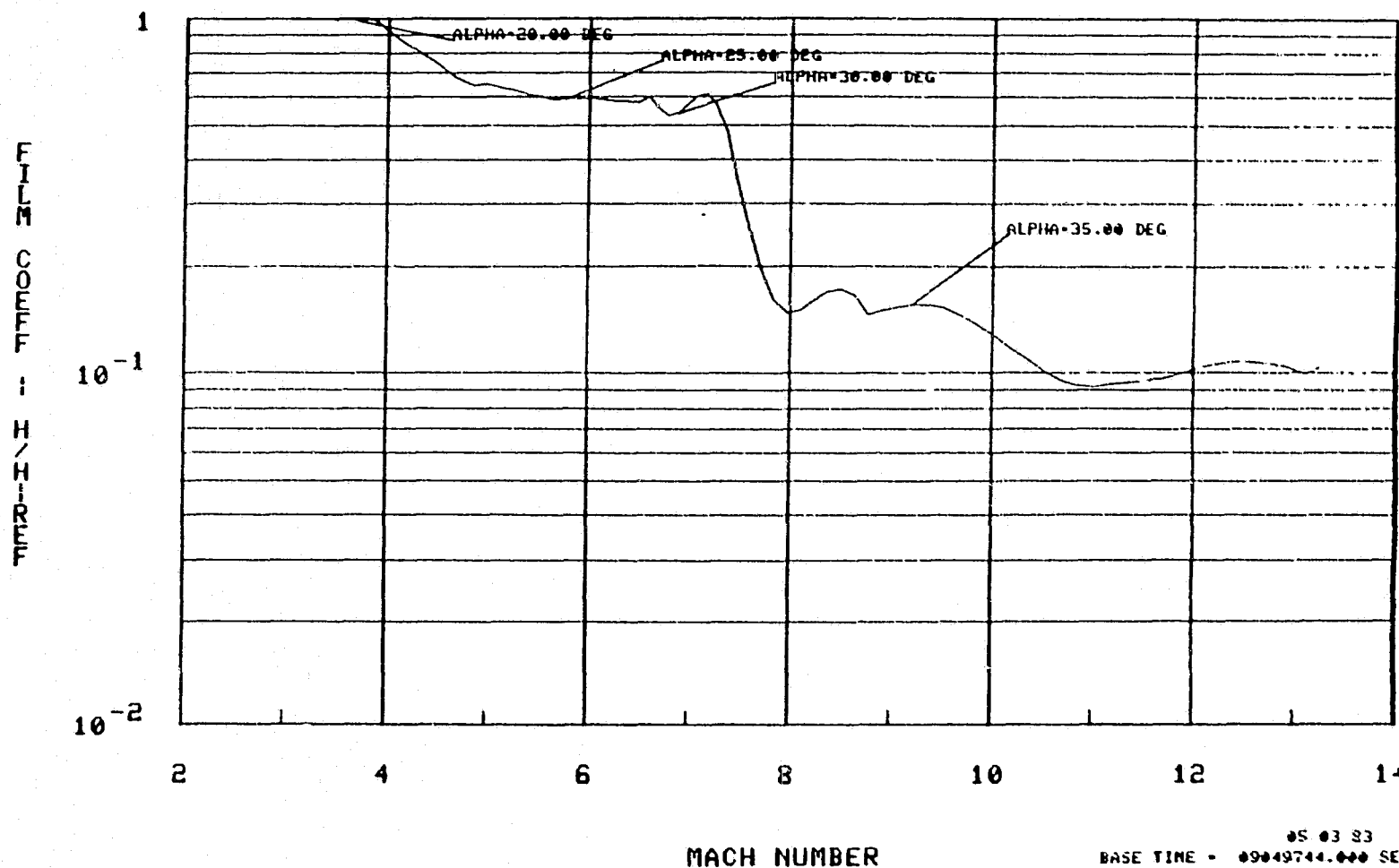
B-55



ORIGINAL PRICE IS
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STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.36

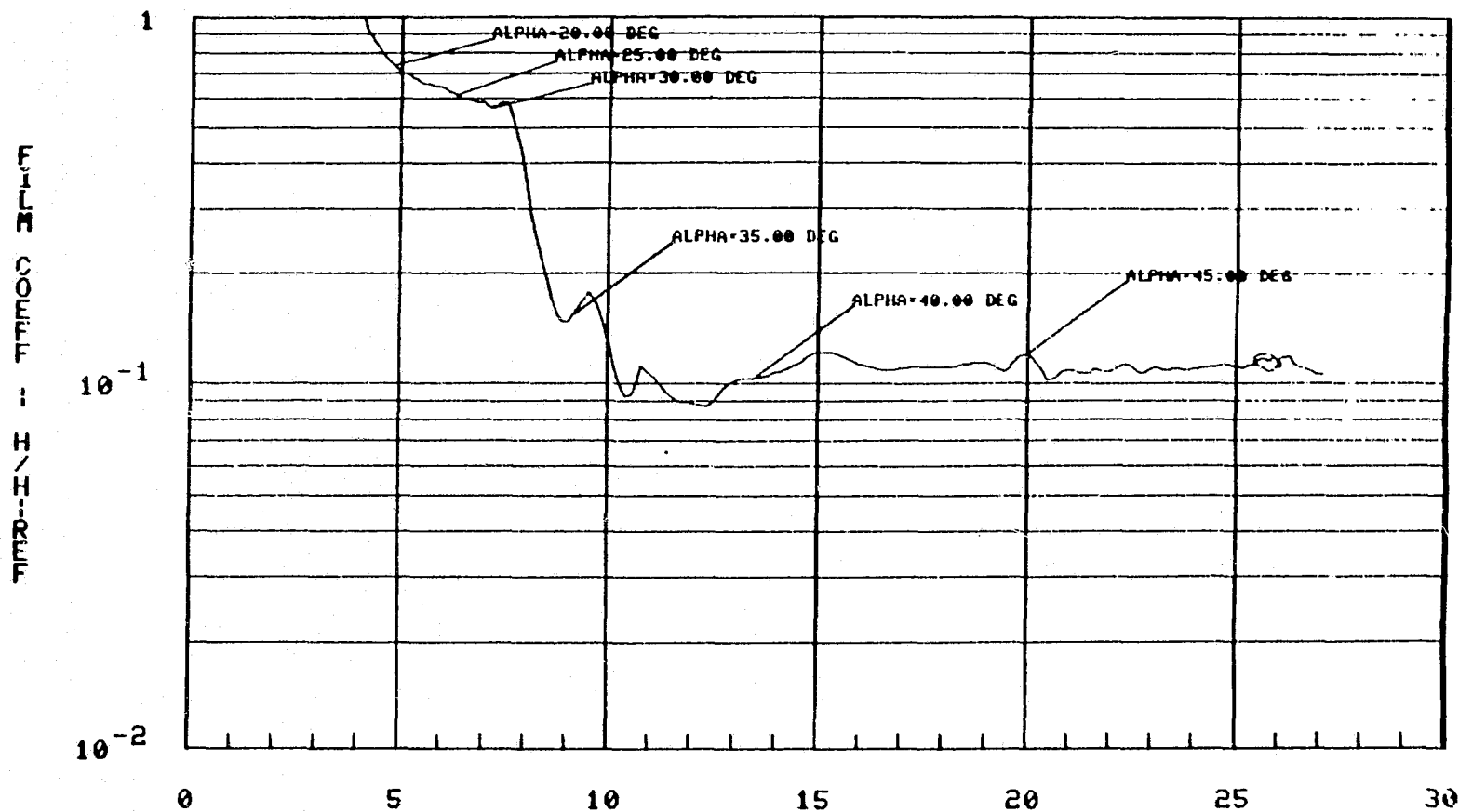
U09T9171A/H-REF 1065-1460 SEC



ORIGINAL PAGE IS
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STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

U09T9171A/H-REF 200-1480 SEC



ORIGINAL PAGE IS
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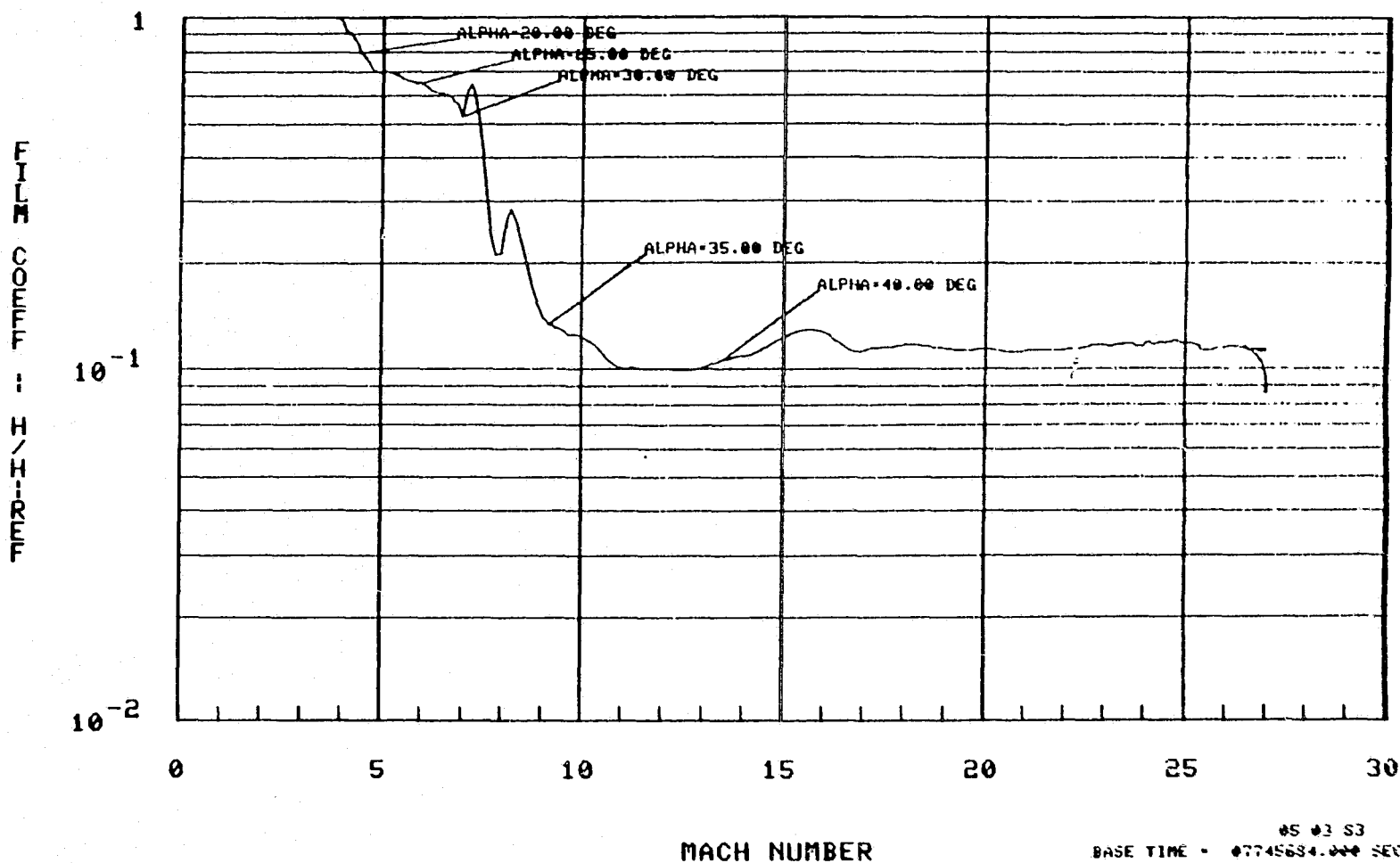
B-57

MACH NUMBER

05 03 53
BASE TIME = 27550236.000 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.36

U09T9171A/H-REF 200-1380 SEC



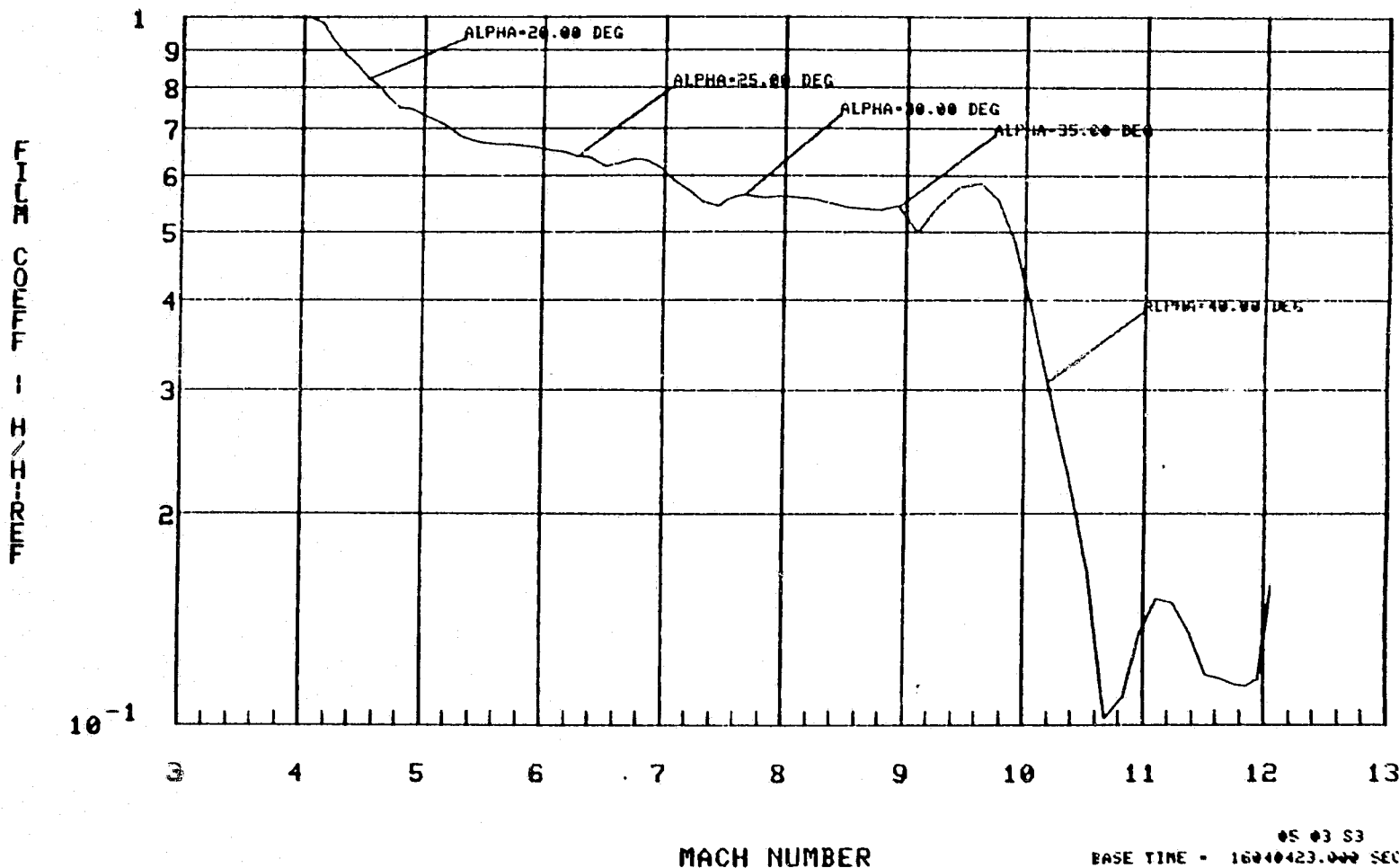
ORIGINAL PAGE IS
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B-58

05 03 S3
BASE TIME - 07745634.000 SEC.

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.36

U0979171A/H-REF 965-1300 SEC



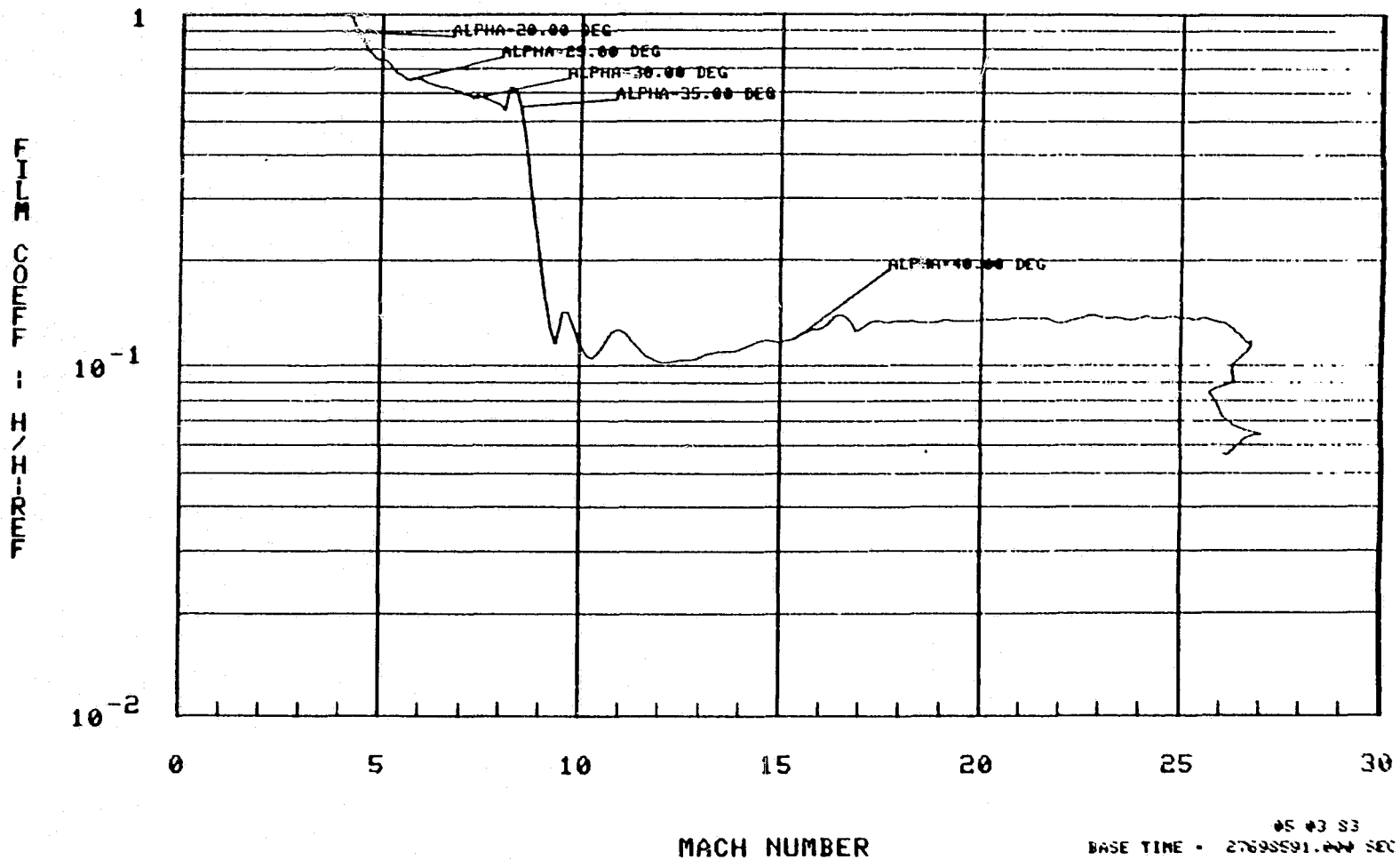
B-59

FILE COME - I/I-REF

ALPHA=20.00 DEG

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.36

U09T9171A/H-REF 150-1350 SEC



B-60

ORIGINAL PAGE IS
OF POOR QUALITY

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.36

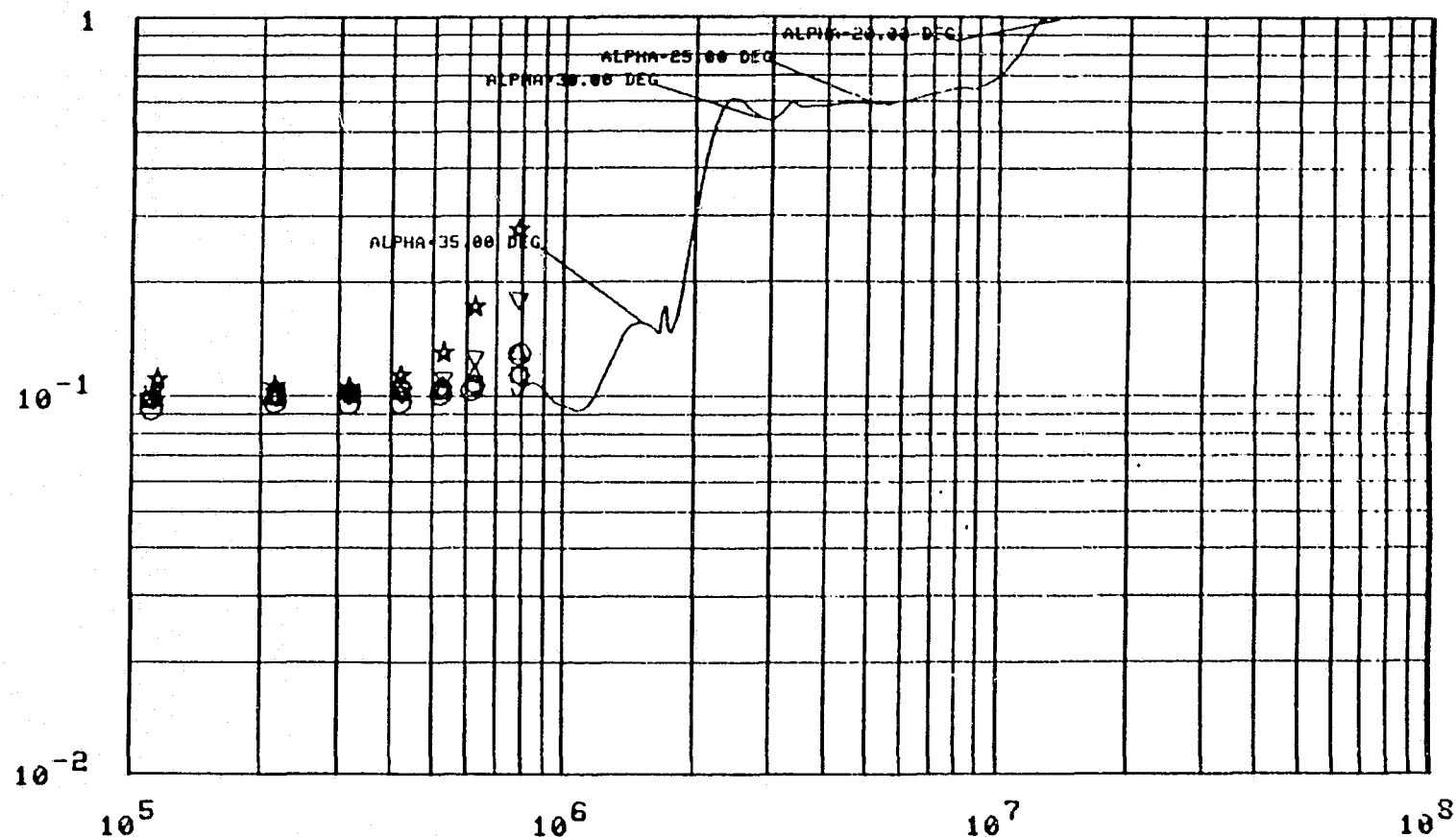
U09T9171A/H-REF 1005-1460 SEC

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

FILE CODE - H/H-REF

B-61



REYNOLDS NUMBER (NS)

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BASE TIME = 09049744.000 SEC.

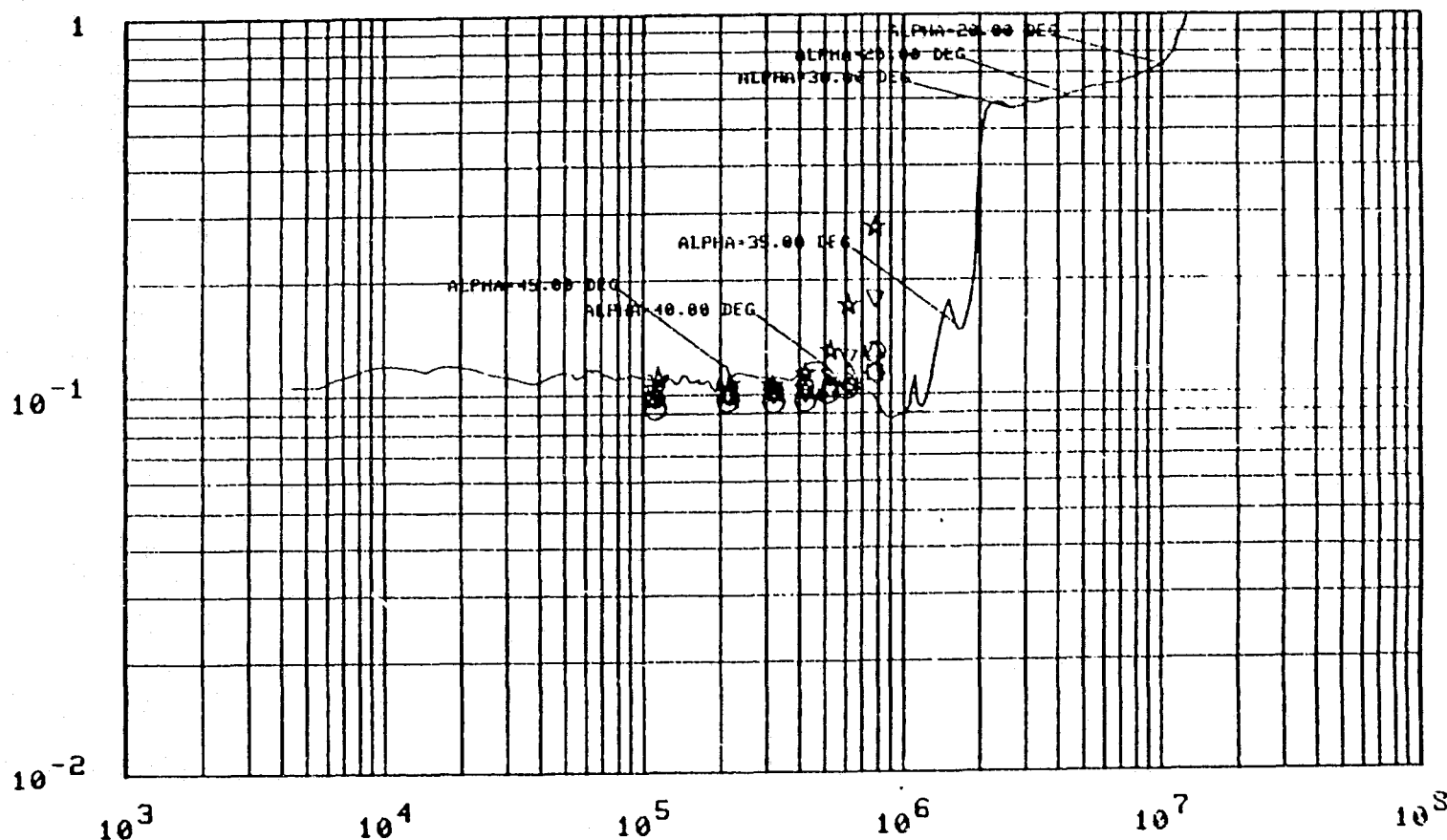
STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U09T9171A/H-REF 200-1420 SEC

FILE CODE: H-H-REF



ORIGINAL DRAWING
OF FOCK QUA 31

B-62

REYNOLDS NUMBER (NS)

05 03 53
BASE TIME = 27550336.444 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.36

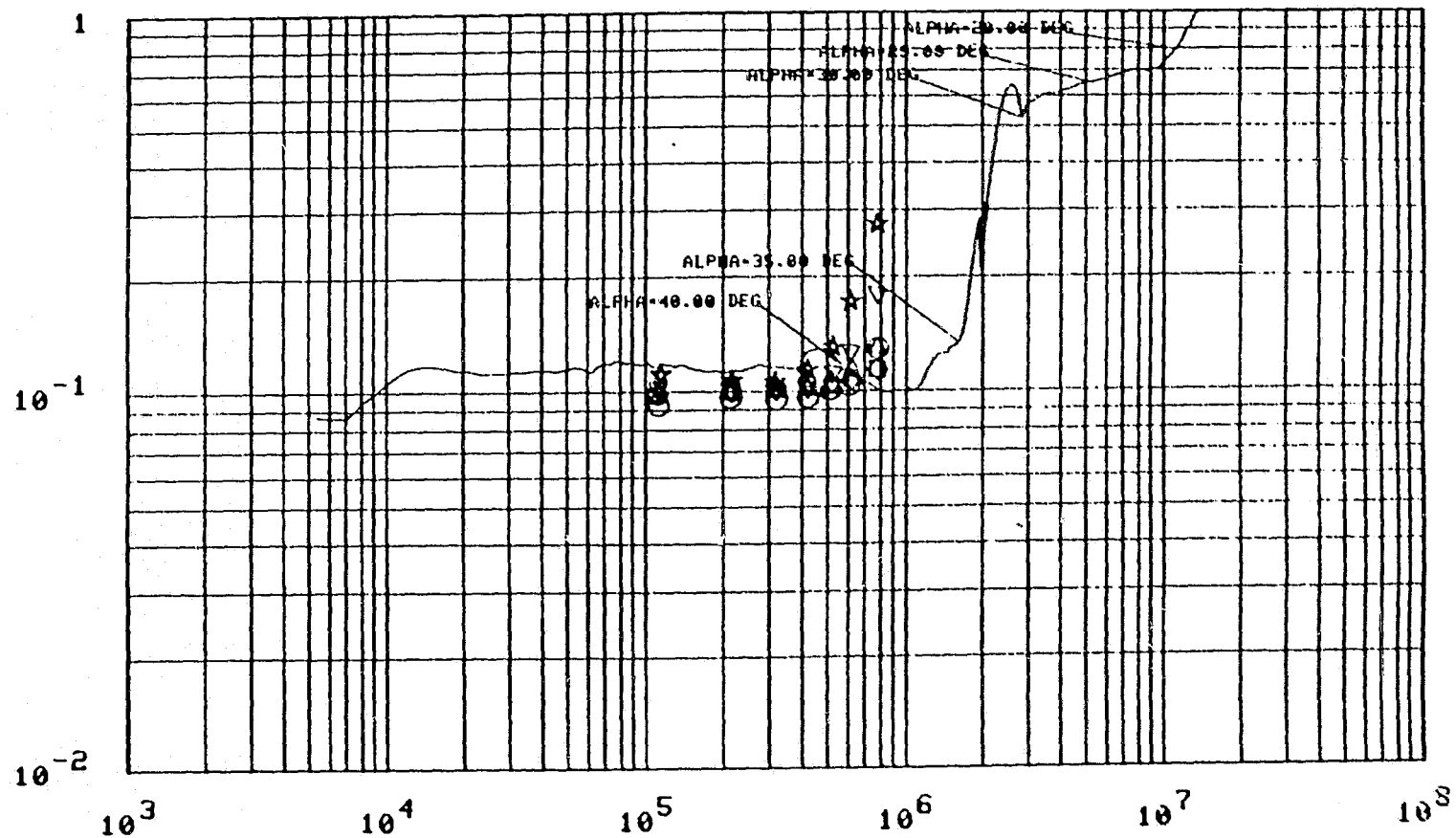
U69T9171A/H-REF 200-1320 SEC

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

LINE CODE - H-H-000

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REYNOLDS NUMBER (NS)

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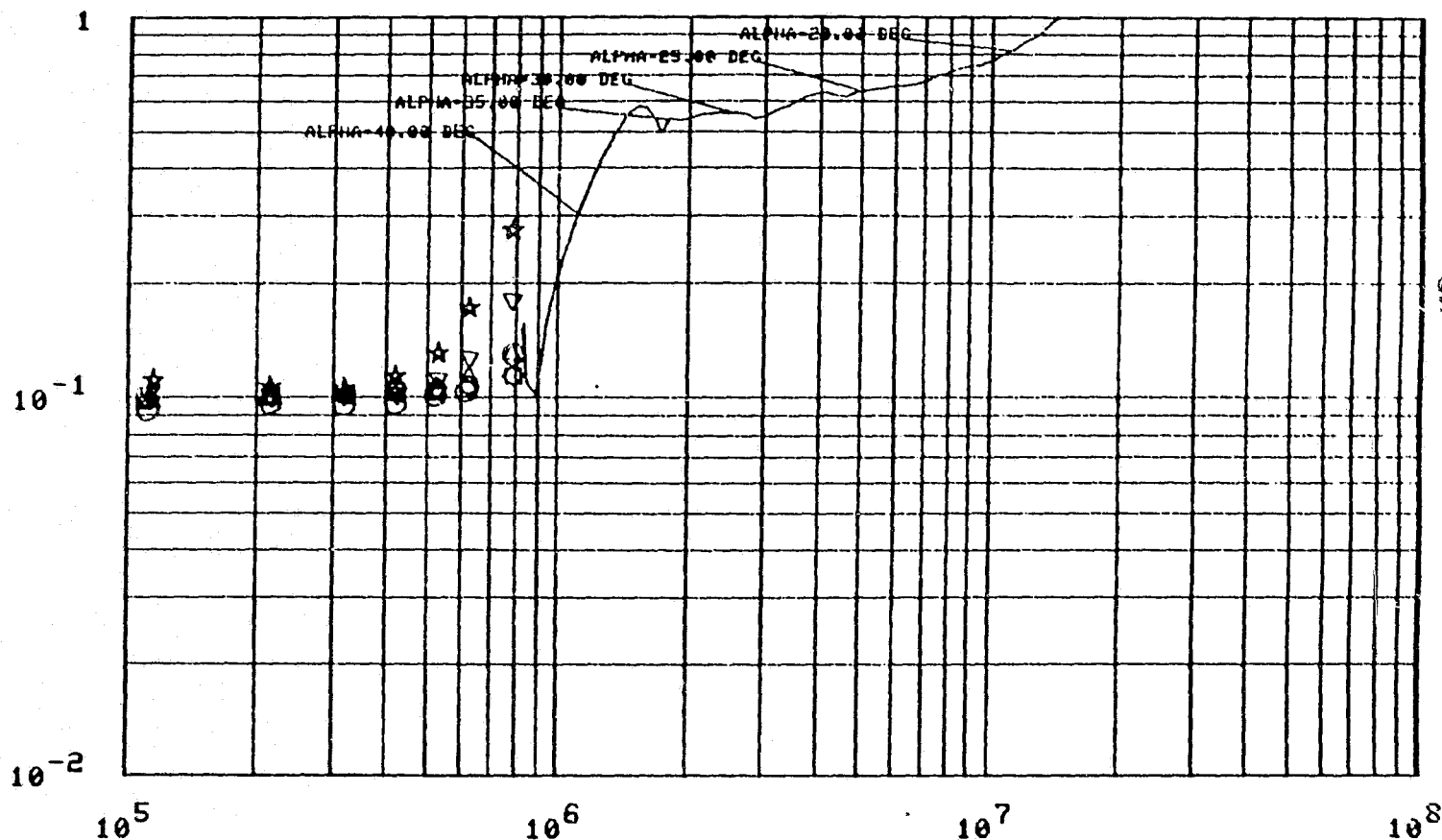
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.36

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U09T9171A/H-REF 965-1300 SEC

FILE COWELL - H/H-KULL



ORIGINAL PAGE IS
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REYNOLDS NUMBER (NS)

05.03 S3
BASE TIME = 10040423.000 SEC.

B-64

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.36

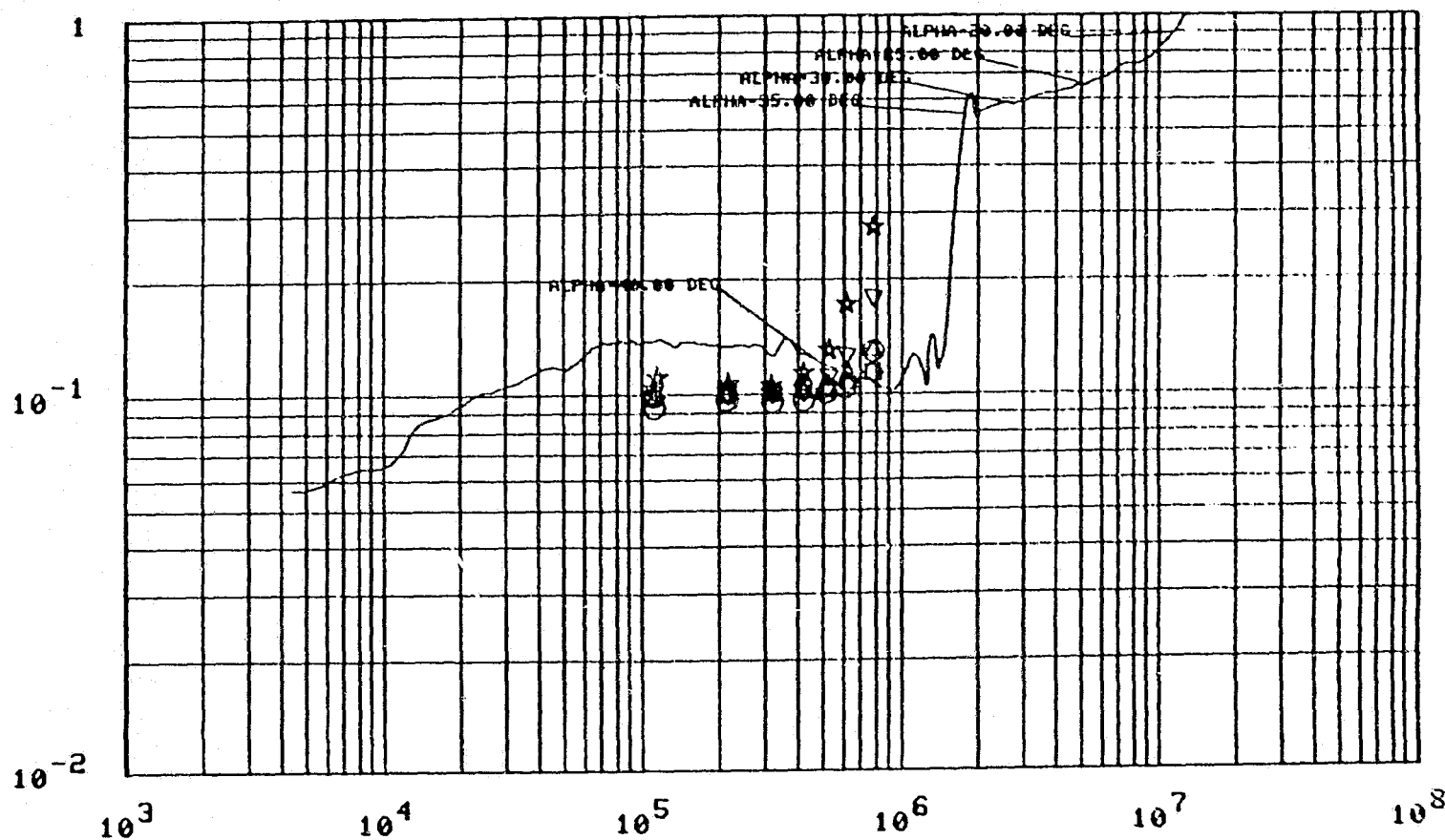
U09T9171A/H-REF 150-1350 SEC

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

FILE CODE - H-H-REF

B-65



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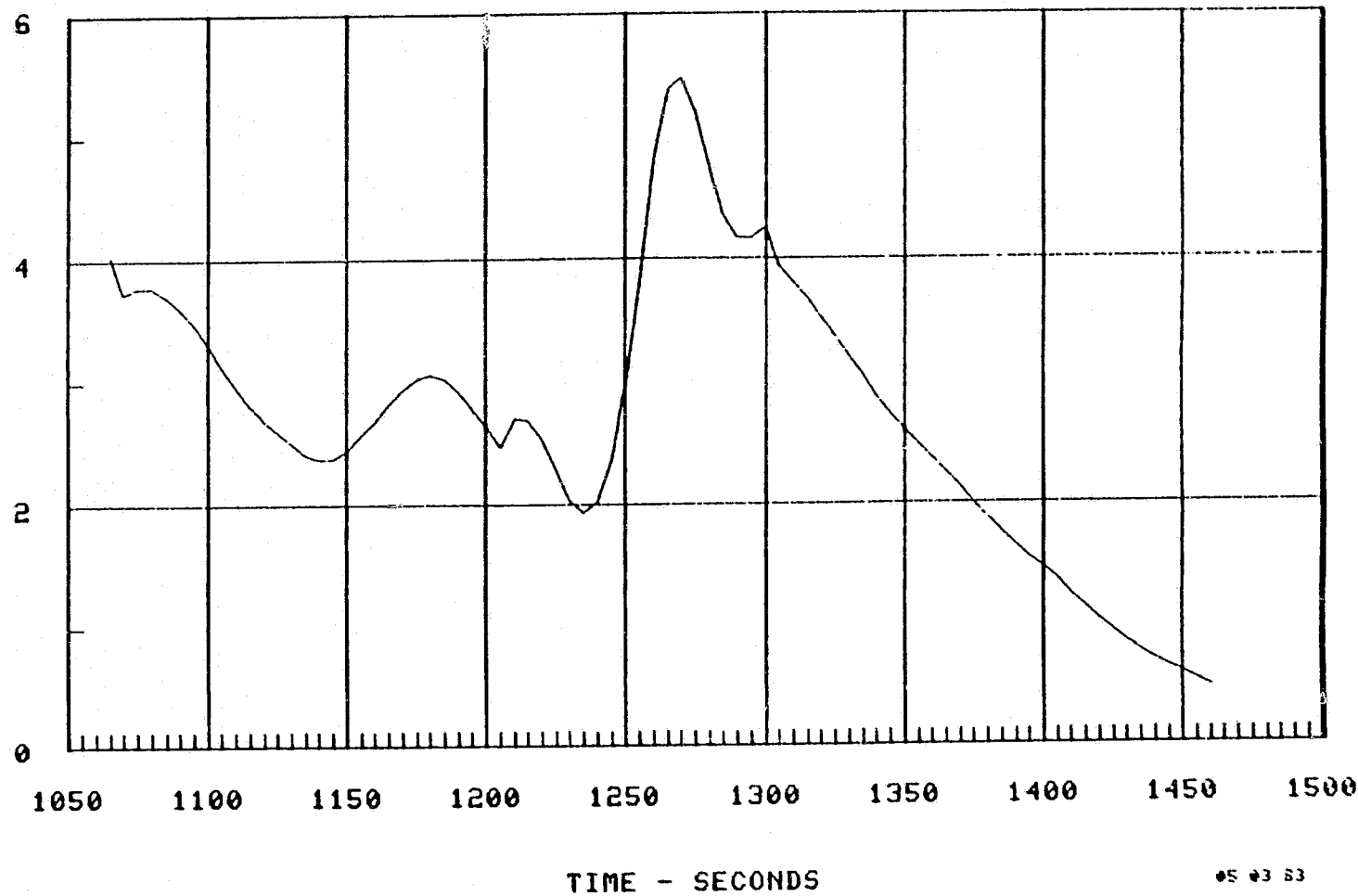
REYNOLDS NUMBER (NS)

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BASE TIME = 27695591.000 SEC.

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

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HEATING RATE - BULB TEMPERATURE - SEC



ORIGINAL PAGE IS
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B-66

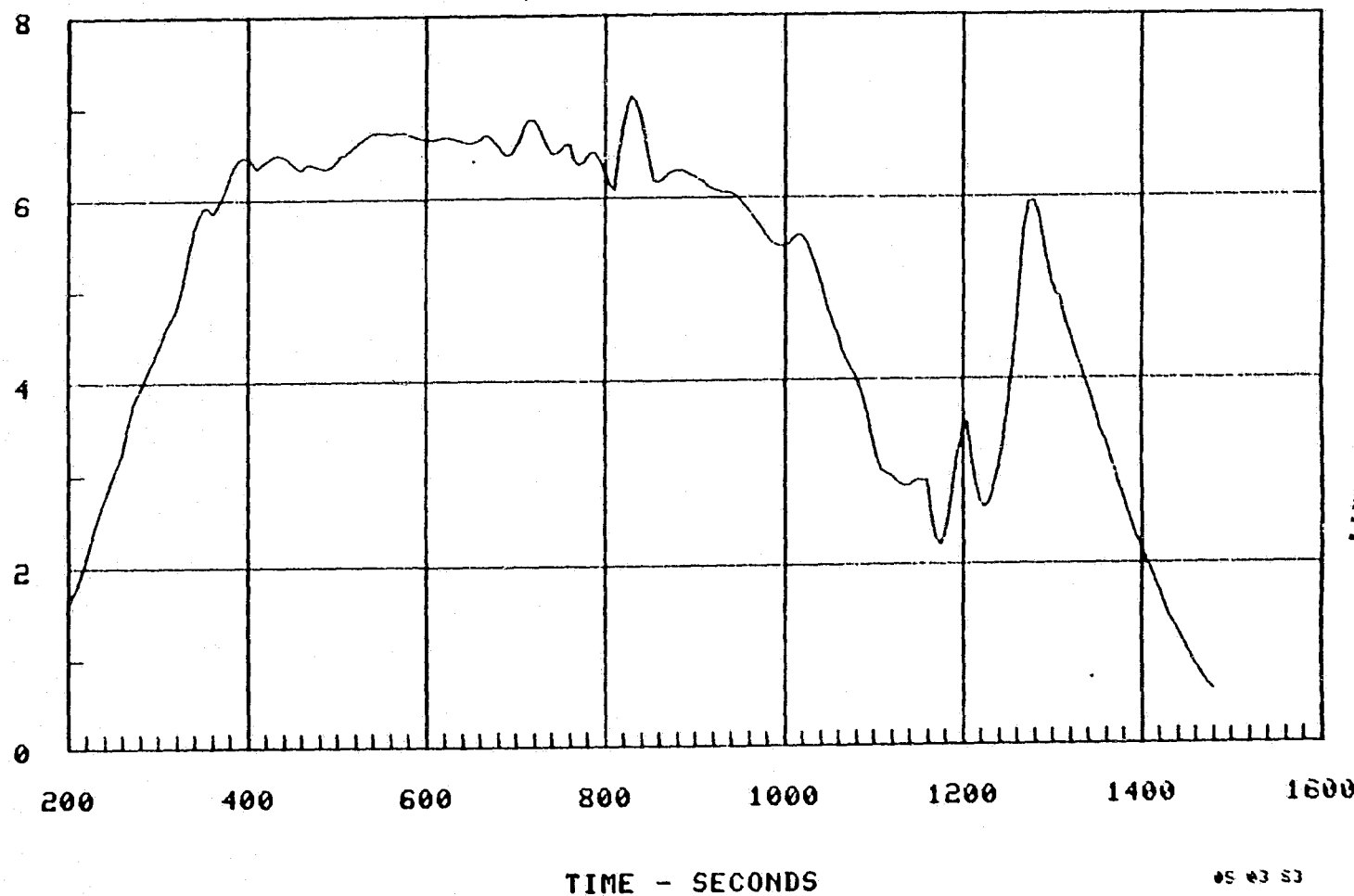
05 03 83

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

U09T9171A

HEADING RATE -- DEGREES PER SECOND

ORIGINAL FILED IN
OF POOR QUALITY



05 03 53

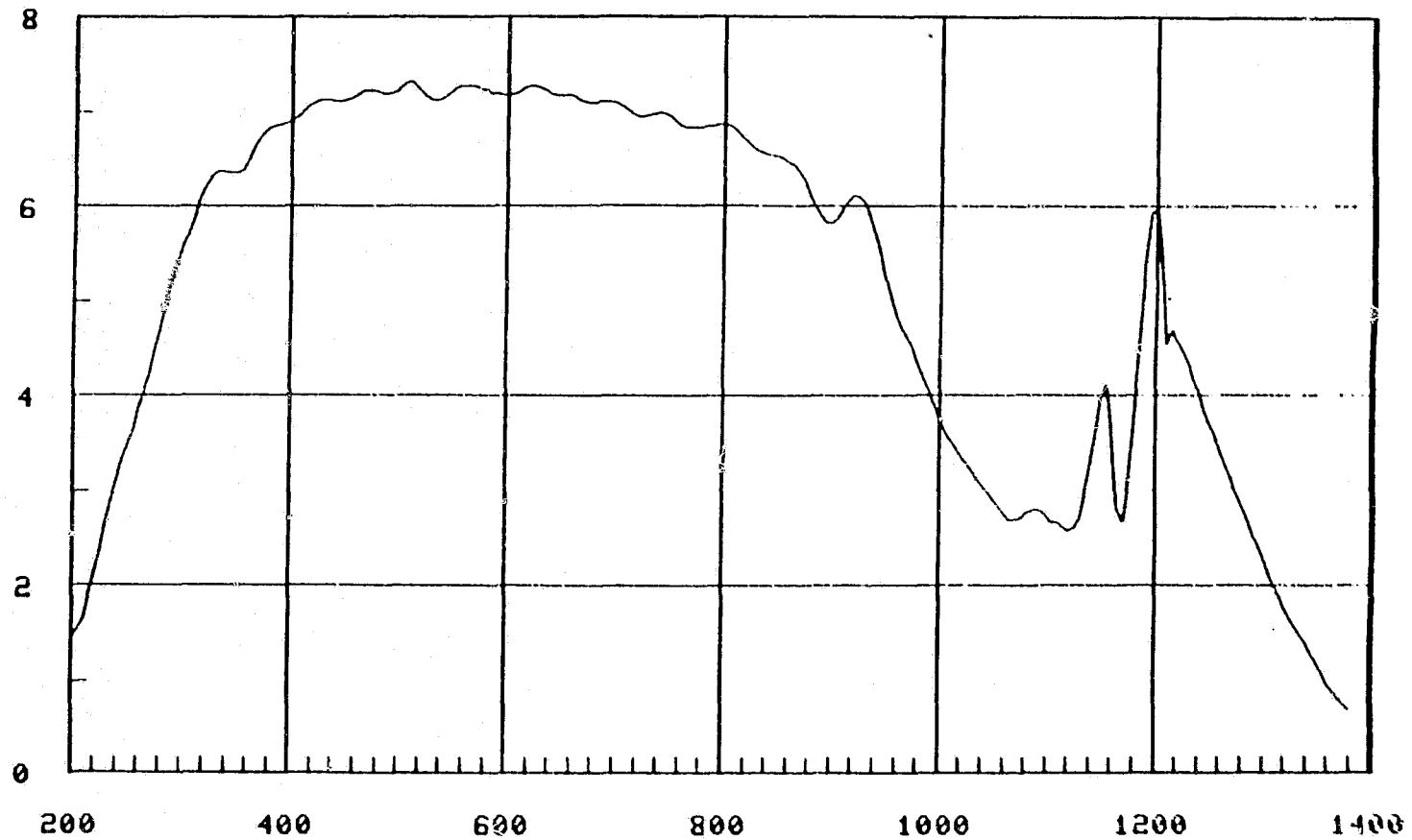
B-67

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

U09T9171A

HEATING RATE - BTU/FT² - SEC

B-68



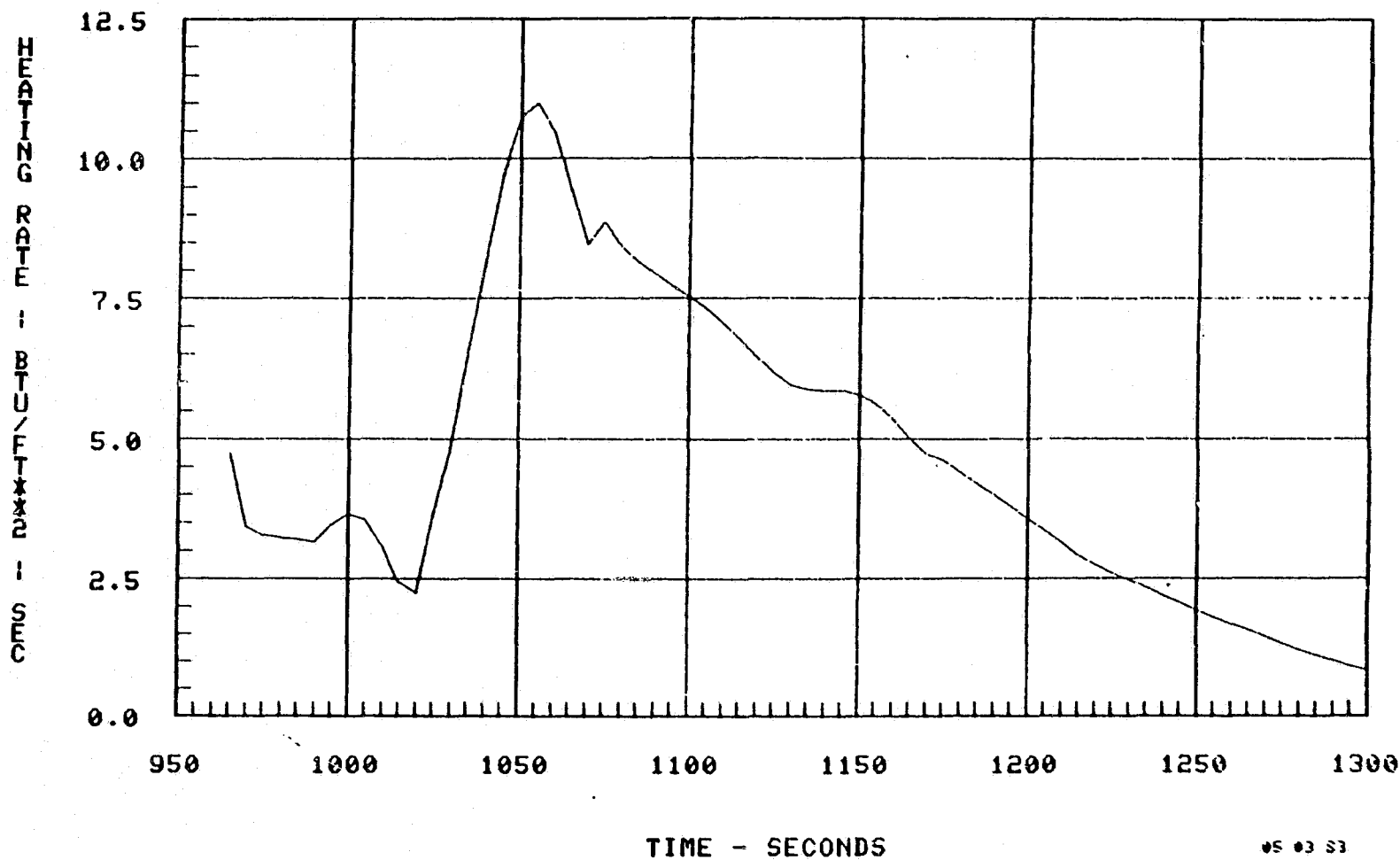
TIME - SECONDS

05 43 S3

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STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

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05 03 53

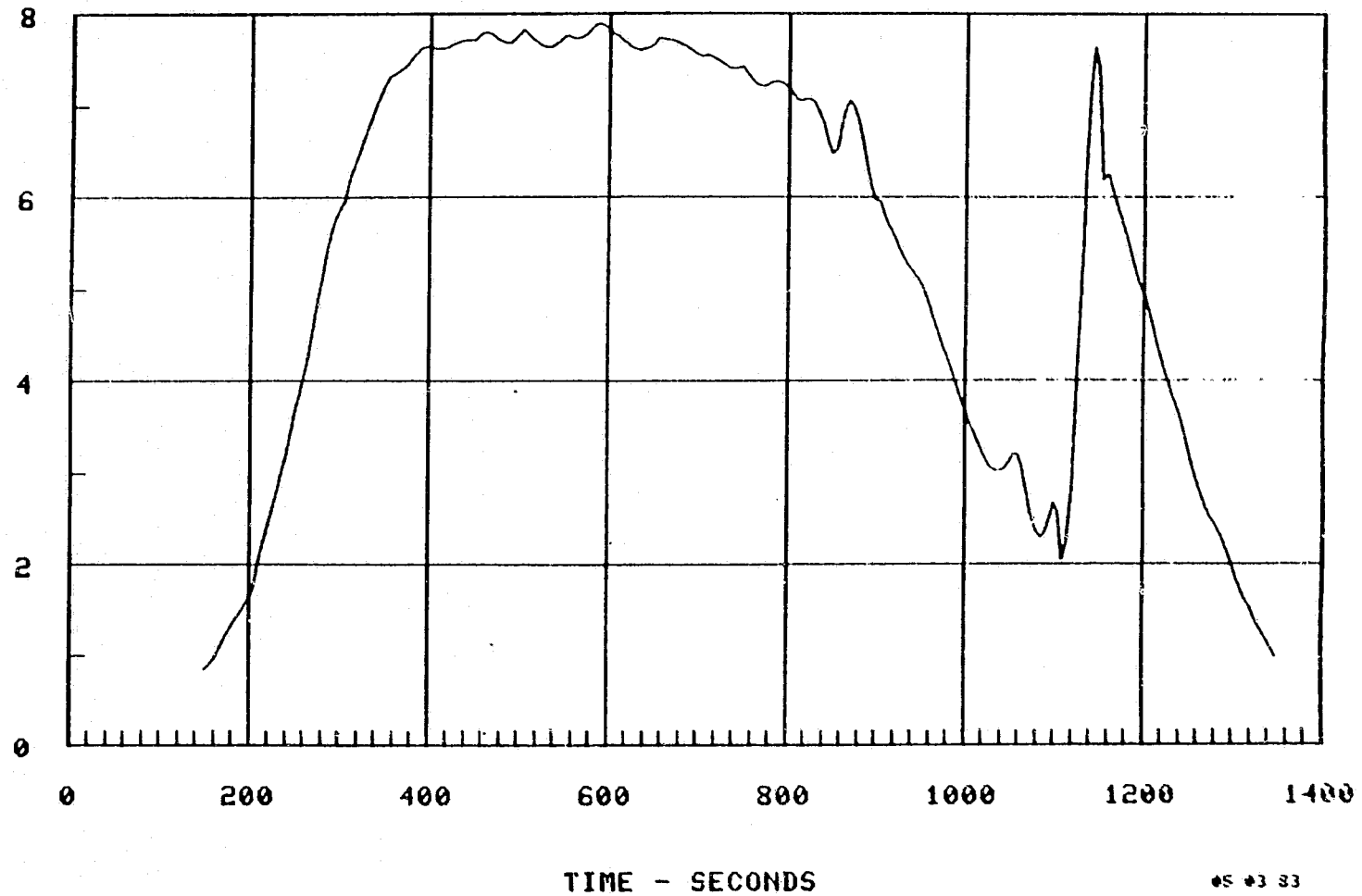
B-69

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

U09T9171A

HEATING RATE - BTD/FT-MIN - GWC

B-70

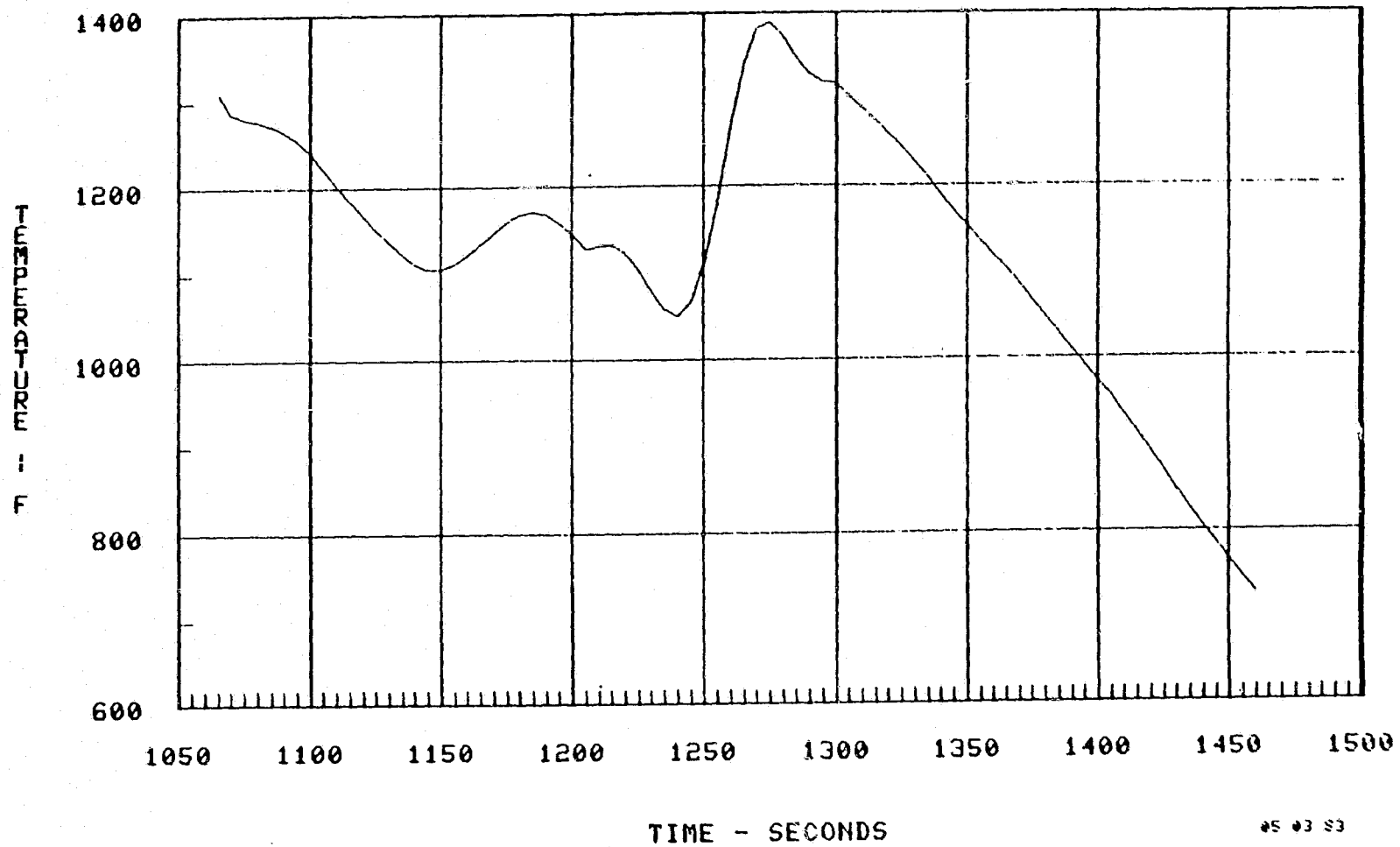


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05 03 33

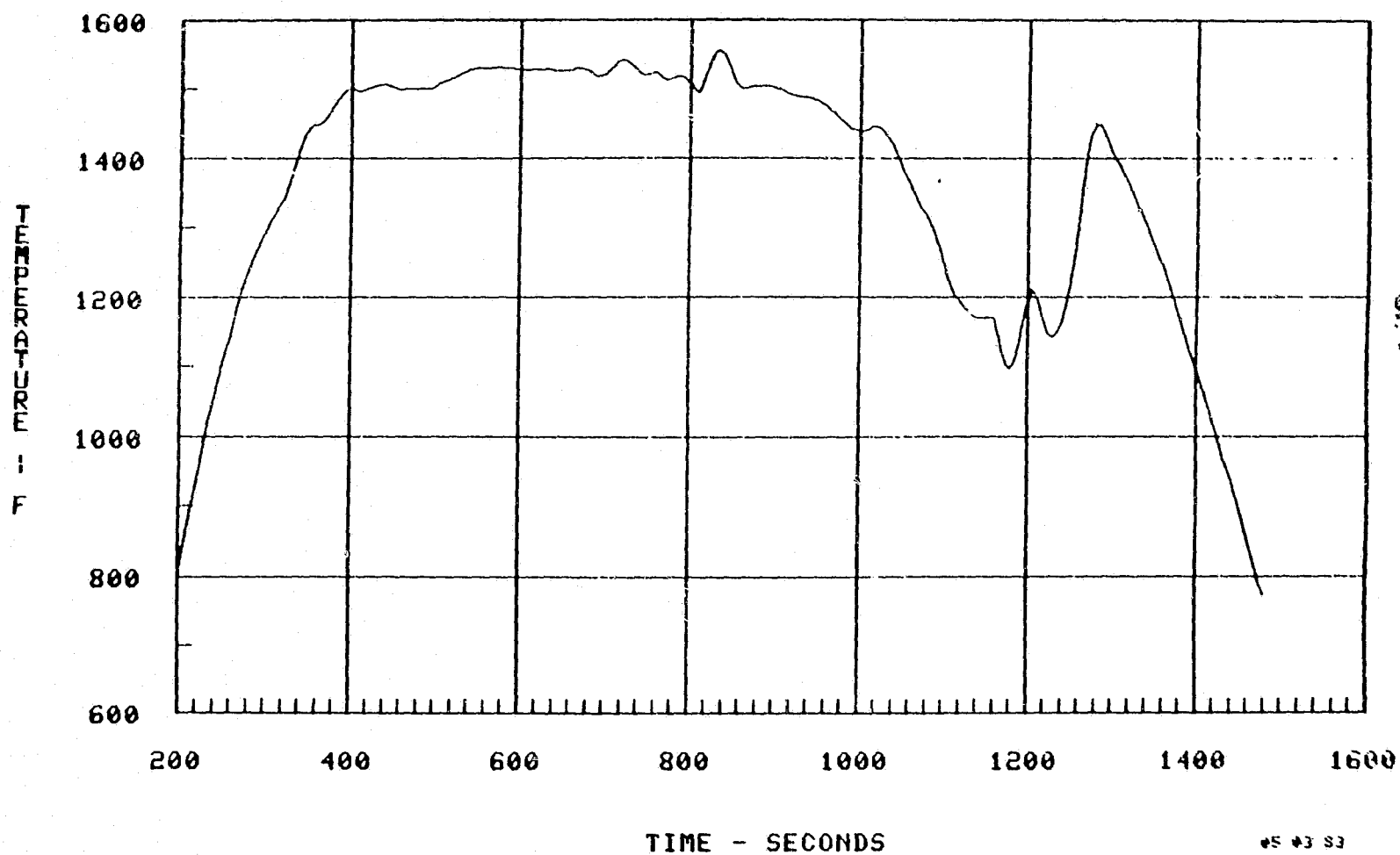
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U09T9171A



STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.36

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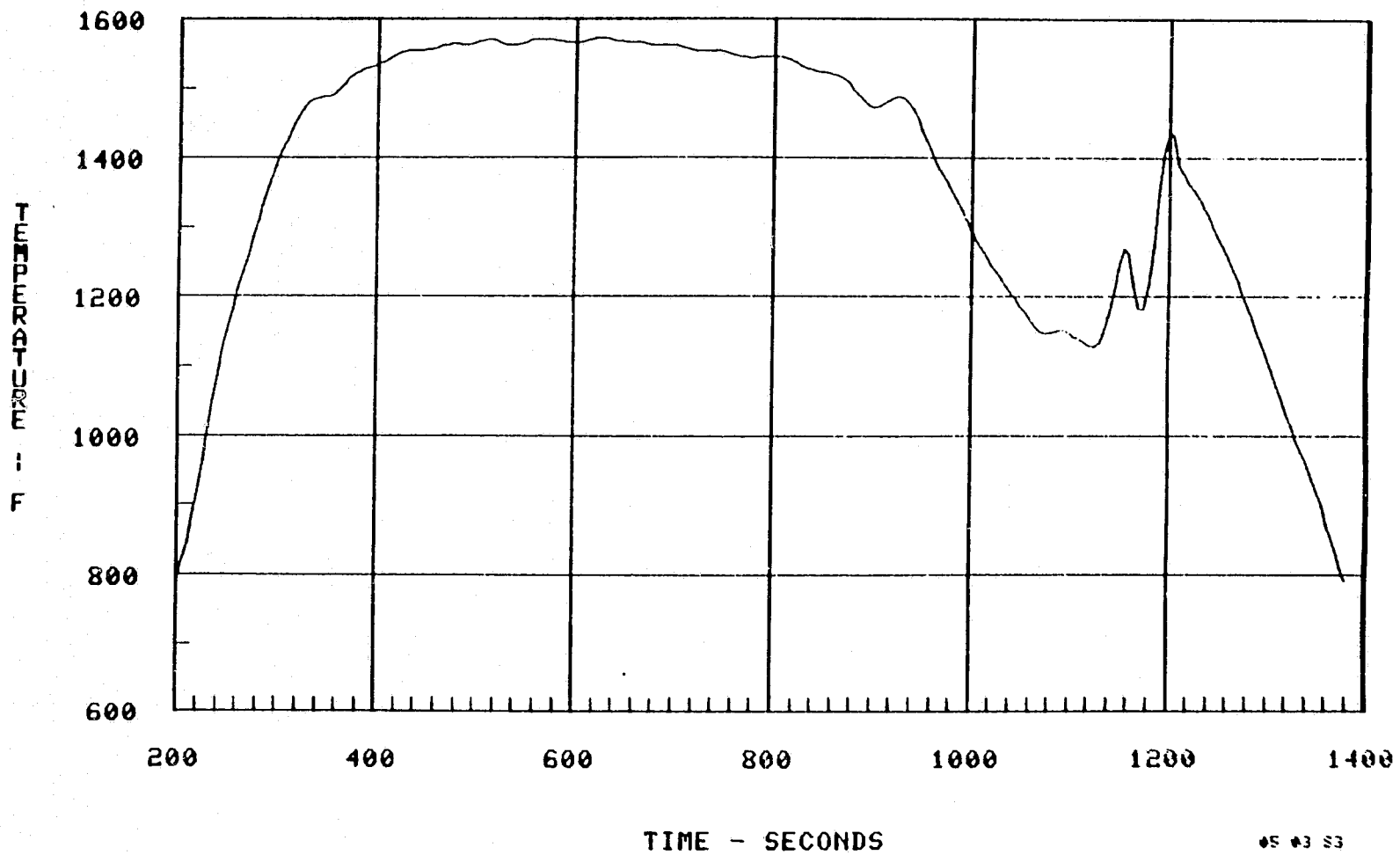


B-72

#5 #3 83

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.36

U09T9171A

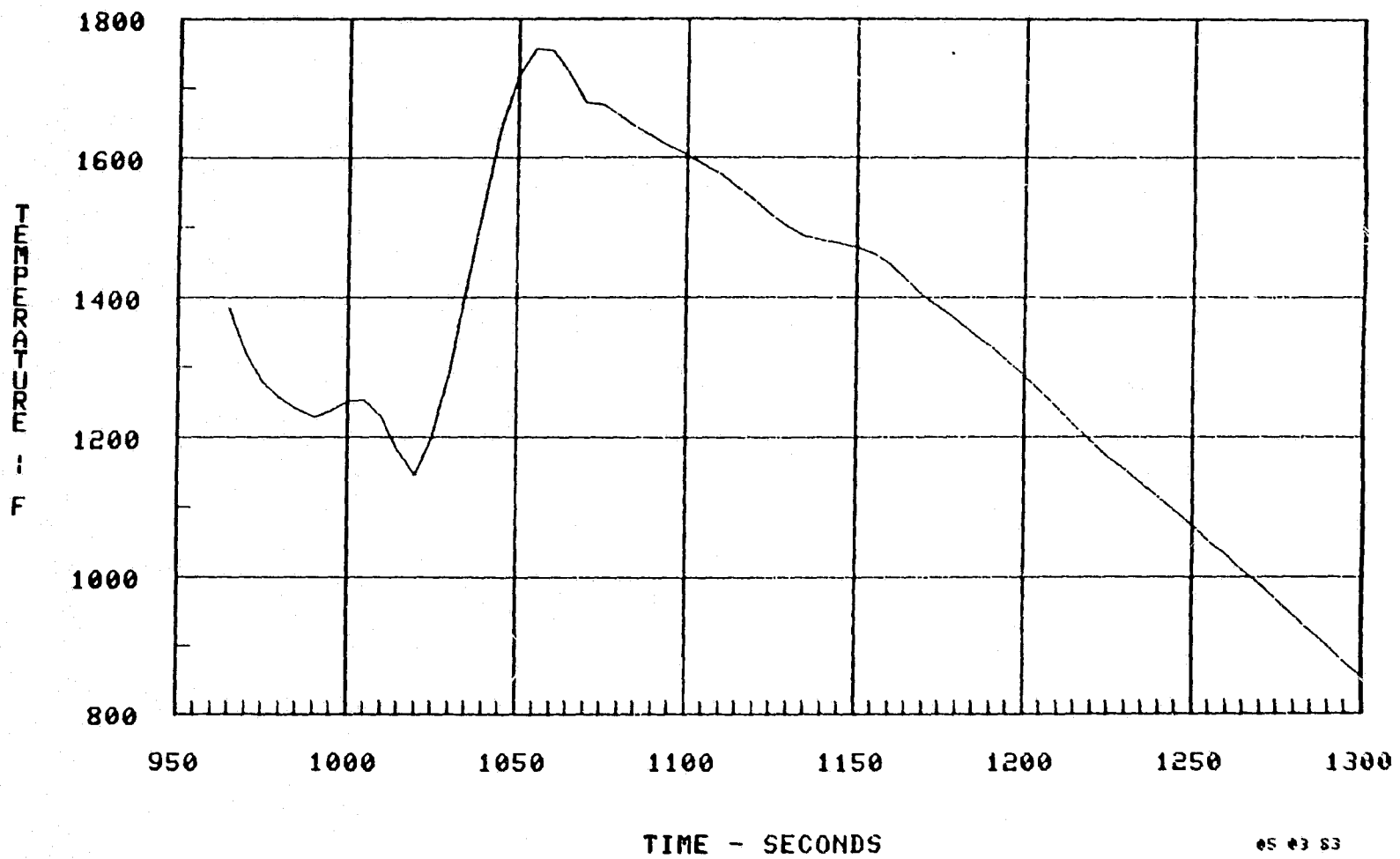


B-73

05 03 53

STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

U09T9171A



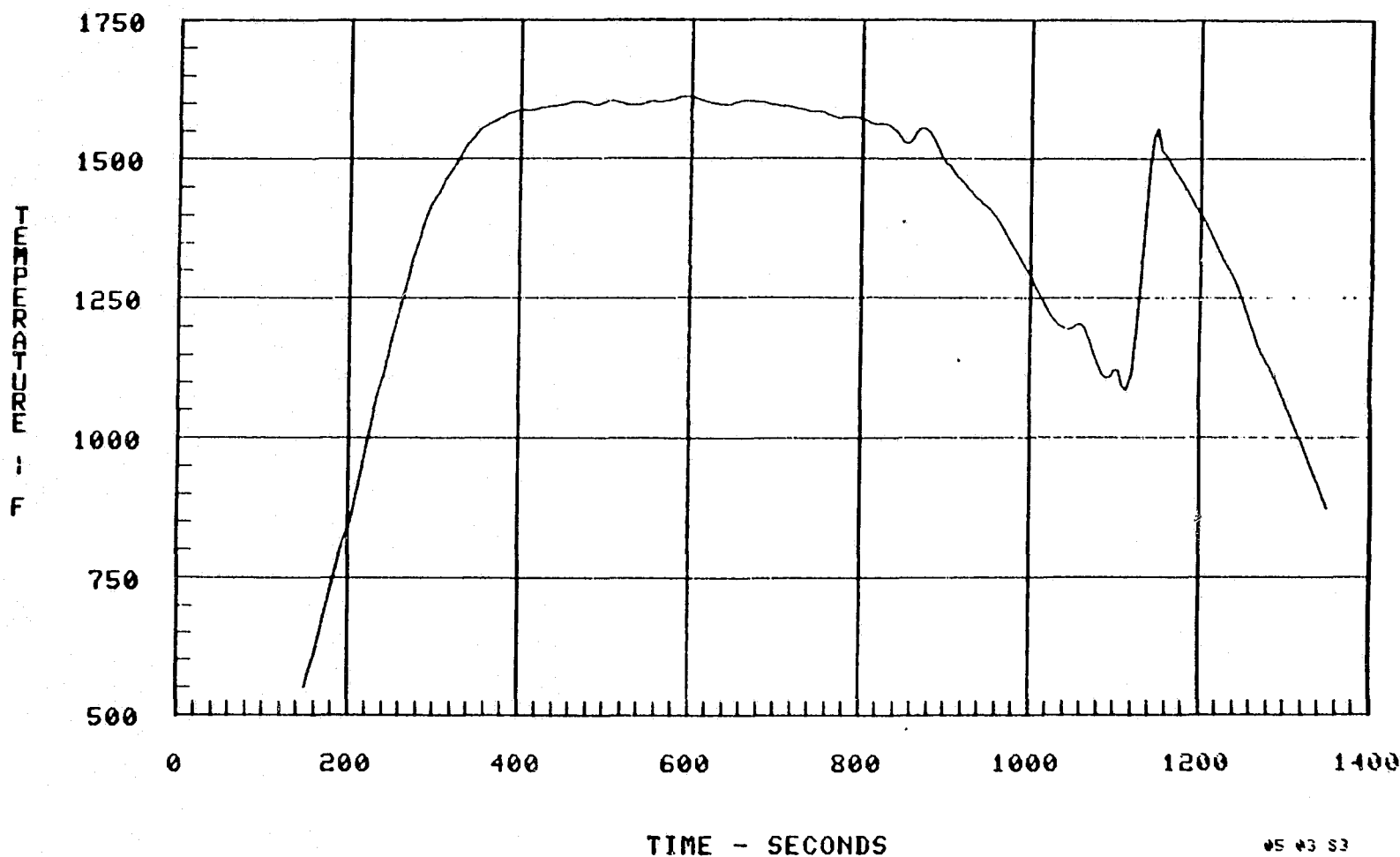
B-74

ORIGINAL PAGE IS
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05 03 83

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.36$

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B-75

ORIGINAL OF 100 COPIES

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.40

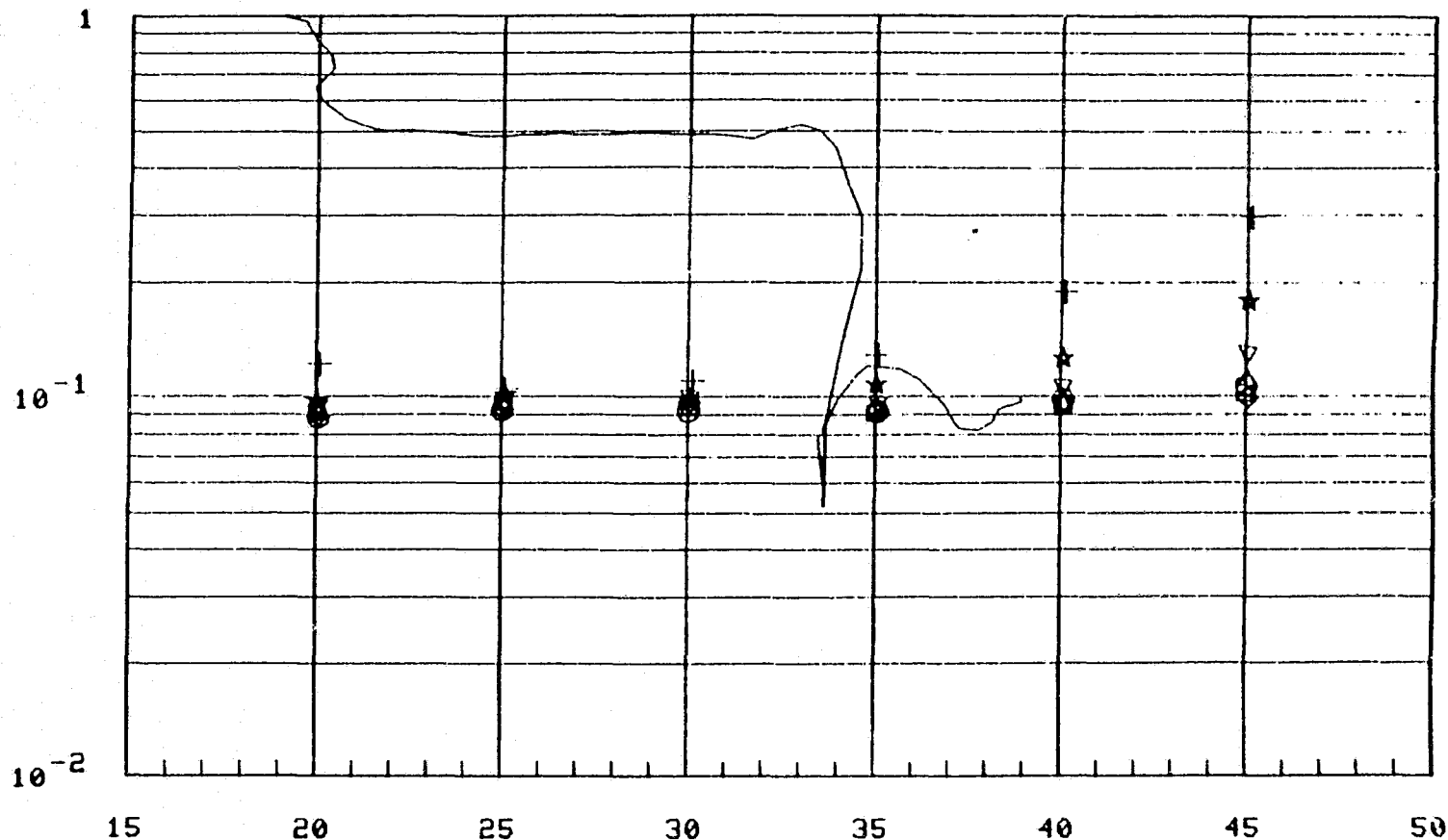
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9670A/H-REF 1065-1460 SEC

FILE COMUL - H-H-QUE

B-76



ORIGINAL PAGE IS
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME = 09049744.000 SEC.

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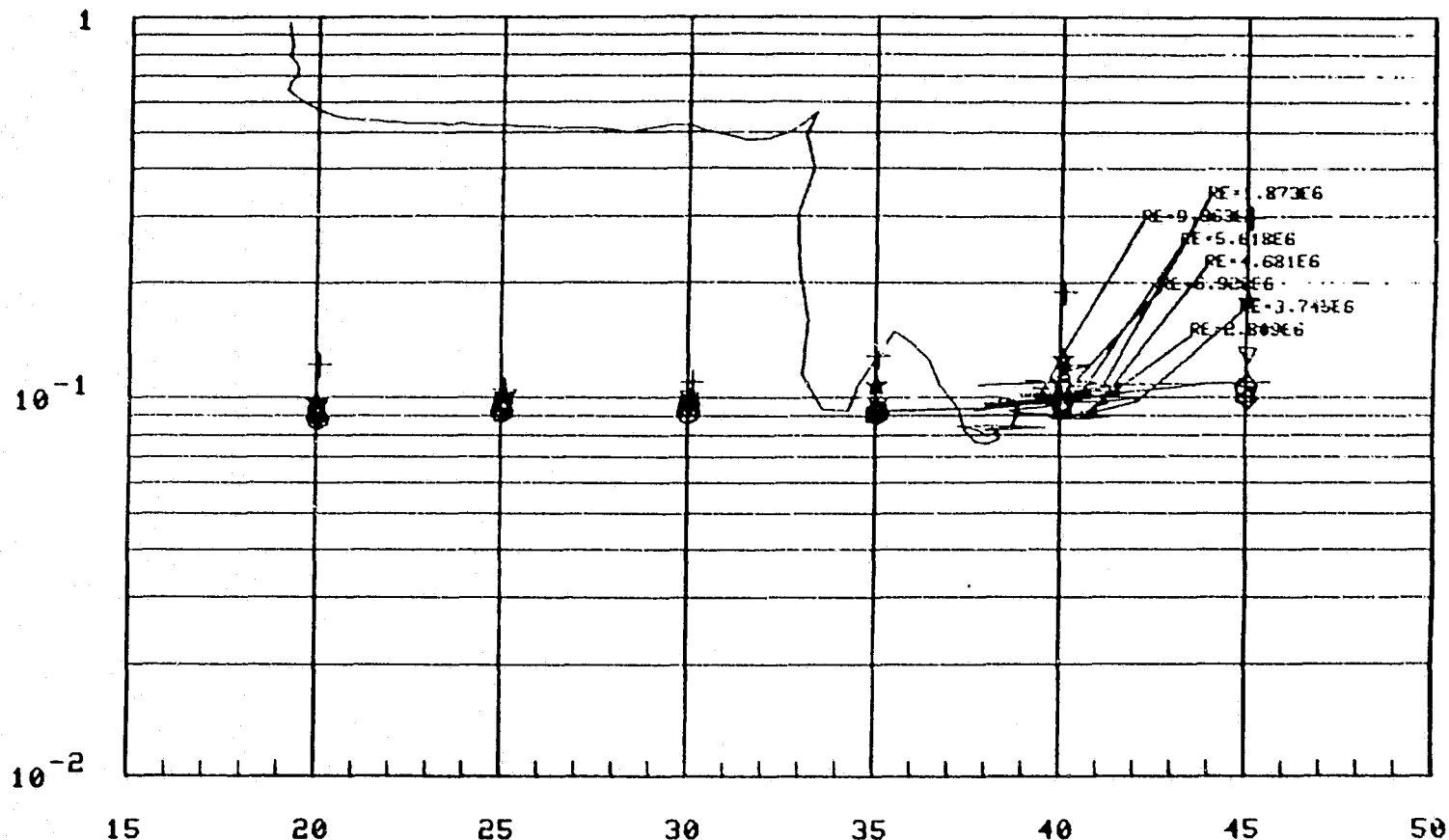
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
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OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9670A/H-REF 200-1480 SEC

FLIGHT COEFF - H/H-REF

B-77



ORIGINAL COPY
OF POCN COPY

ANGLE-OF-ATTACK - DEG

BASE TIME = 2755423.444 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.40

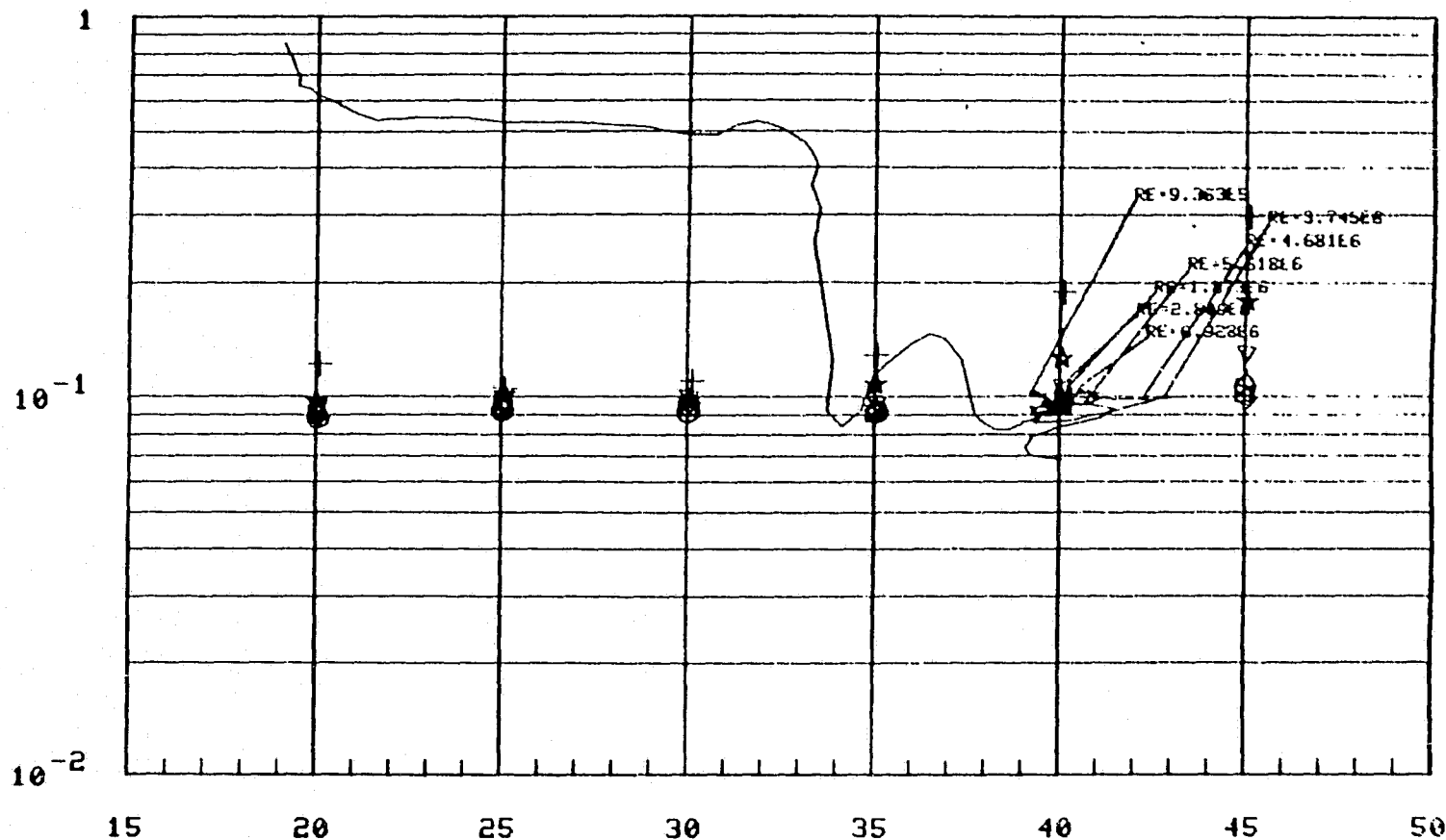
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OH39 0.0175 SCALE RE = 0.5 E06
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OH39 0.0175 SCALE RE = 3.7 E06

U07T9670A/H-REF 200-1380 SEC

LINE CODE - H-H-REF

B-78



ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME = 07745684.000 SEC.

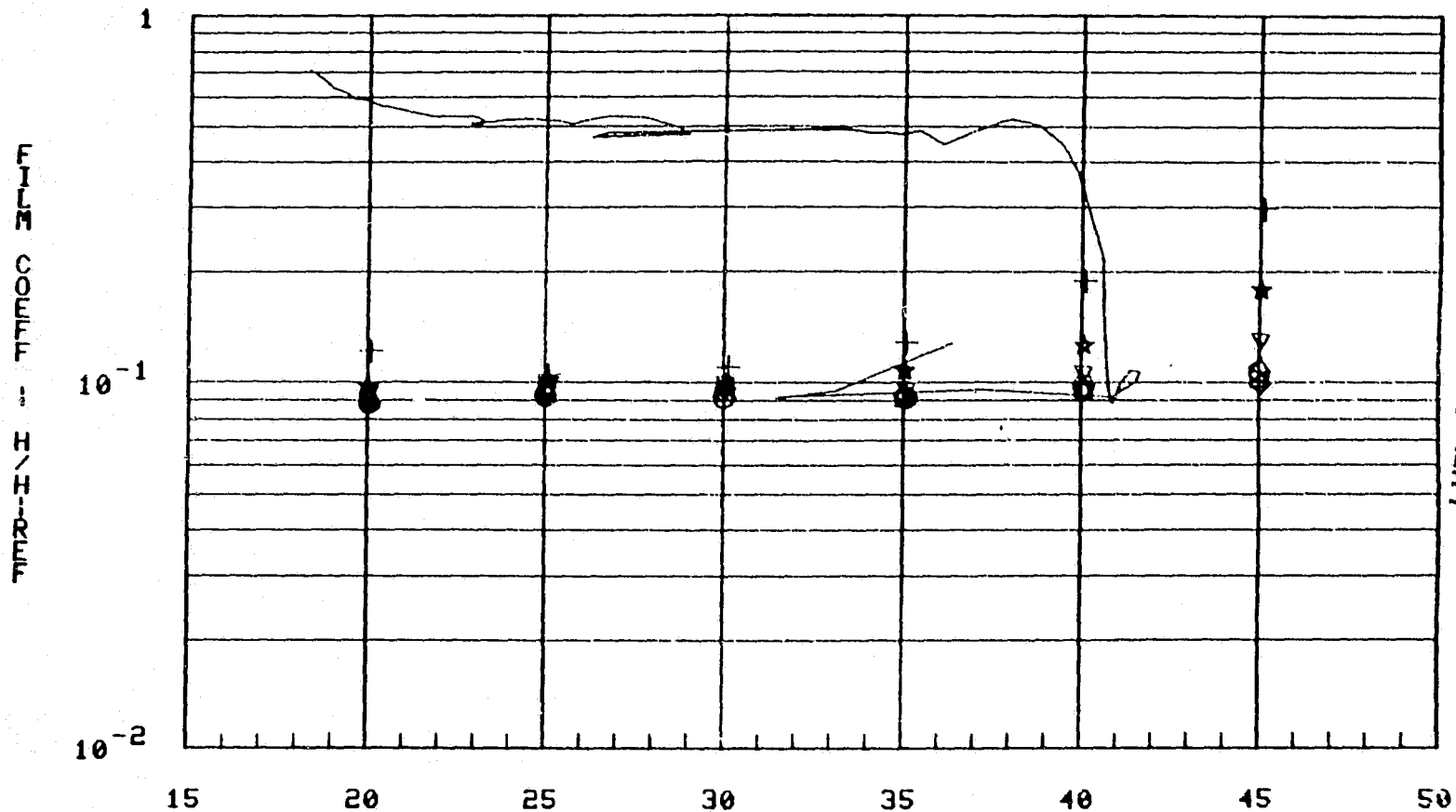
ORIGINAL PAGE IS
OF POOR QUALITY

STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
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OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9670A/H-REF 965-1300 SEC



ORIGINAL PART 10
OF FOUR QUALITY

B-79

ANGLE-OF-ATTACK - DEG

05 03 83
BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.40

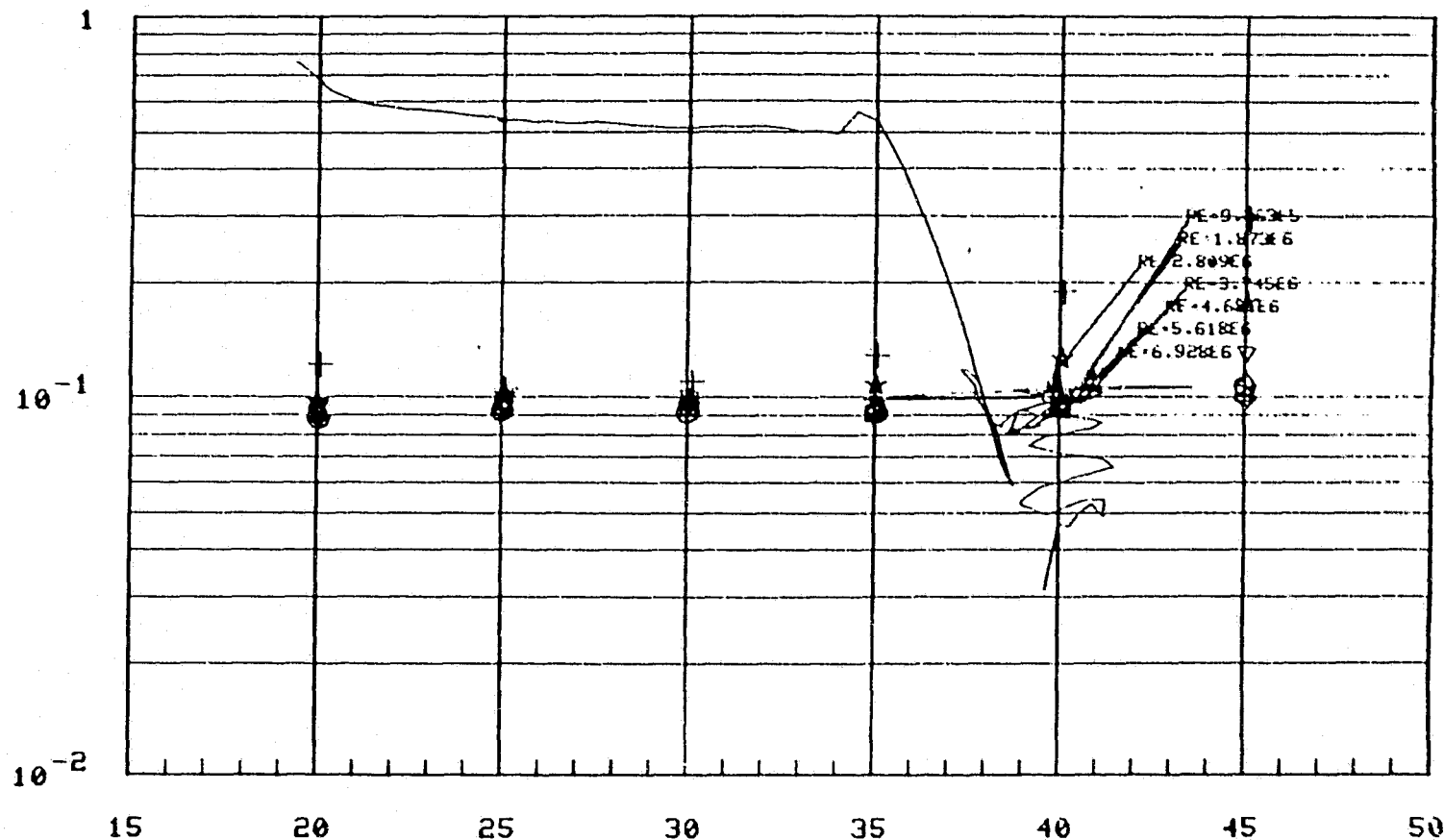
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
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U07T9670A/H-REF 150-1350 SEC

FILE CODE - H/H-REF

B-80



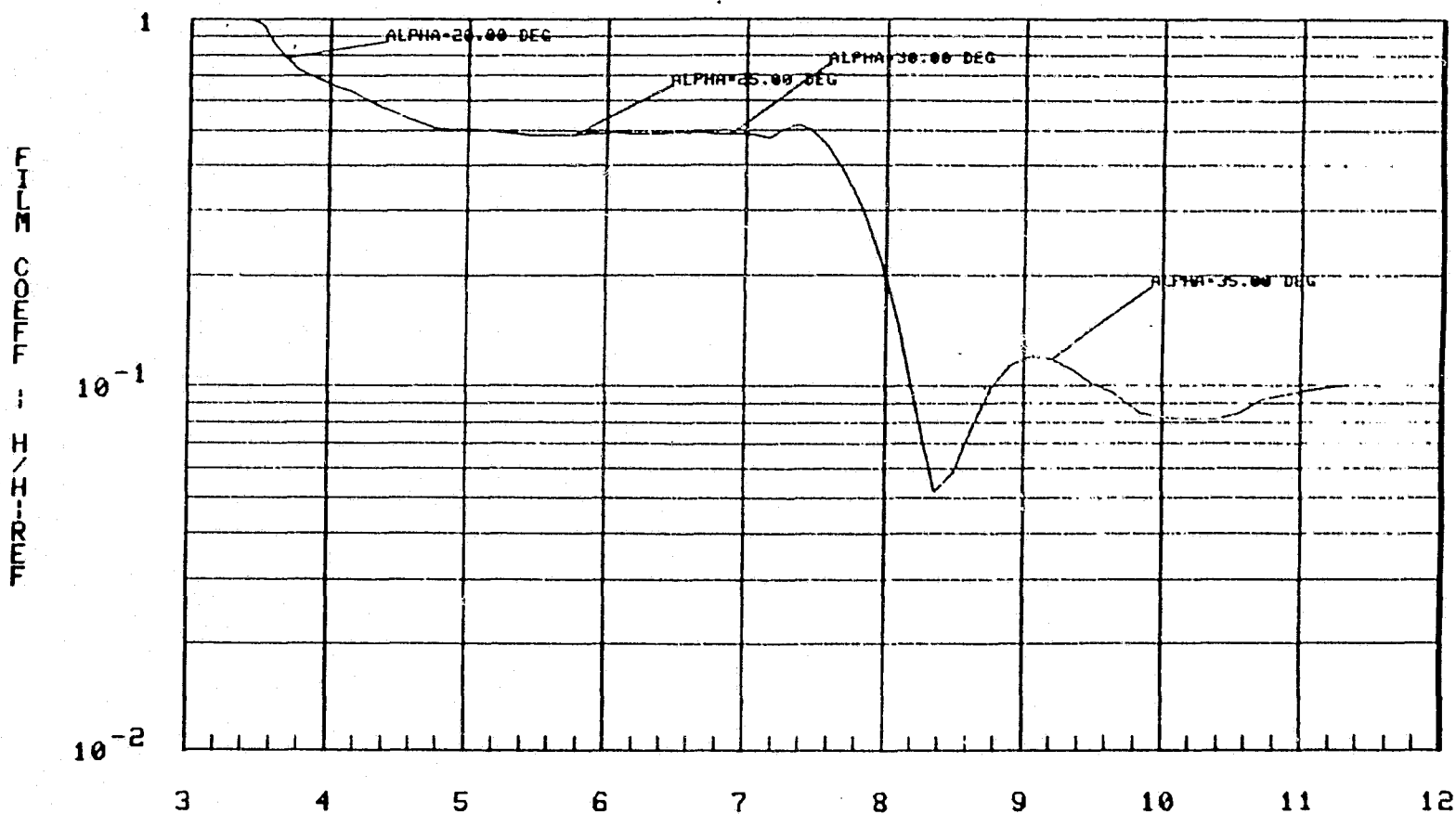
ANGLE-OF-ATTACK - DEG

BASE TIME = 27698591.000 SEC.

ORIGINAL PAGE IS
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STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U07T9670A/H-REF 1065-1460 SEC



B-87

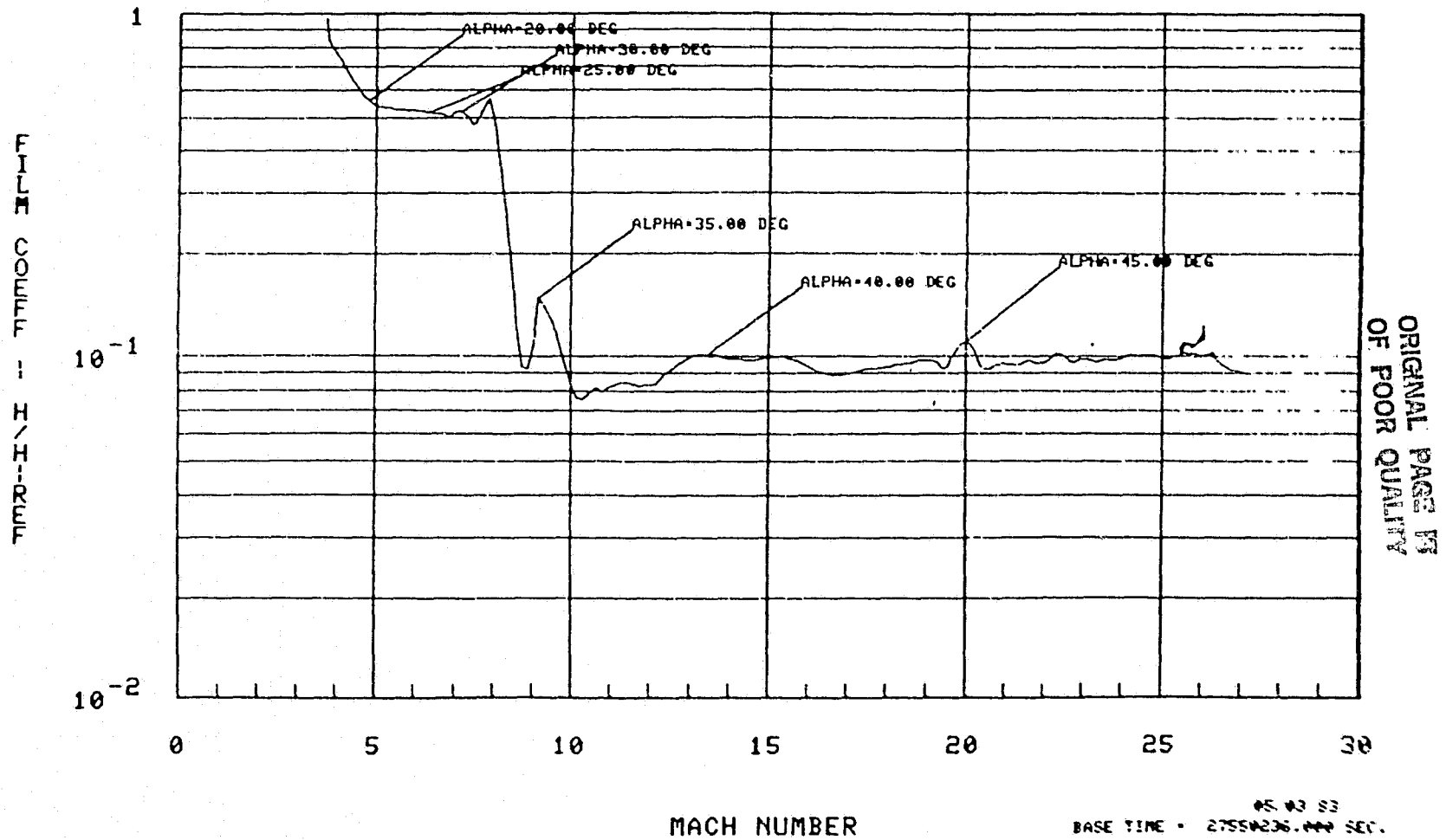
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MACH NUMBER

05 03 83
BASE TIME - 09049744.000 SEC.

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U07T9670A/H-REF 200-1420 SEC

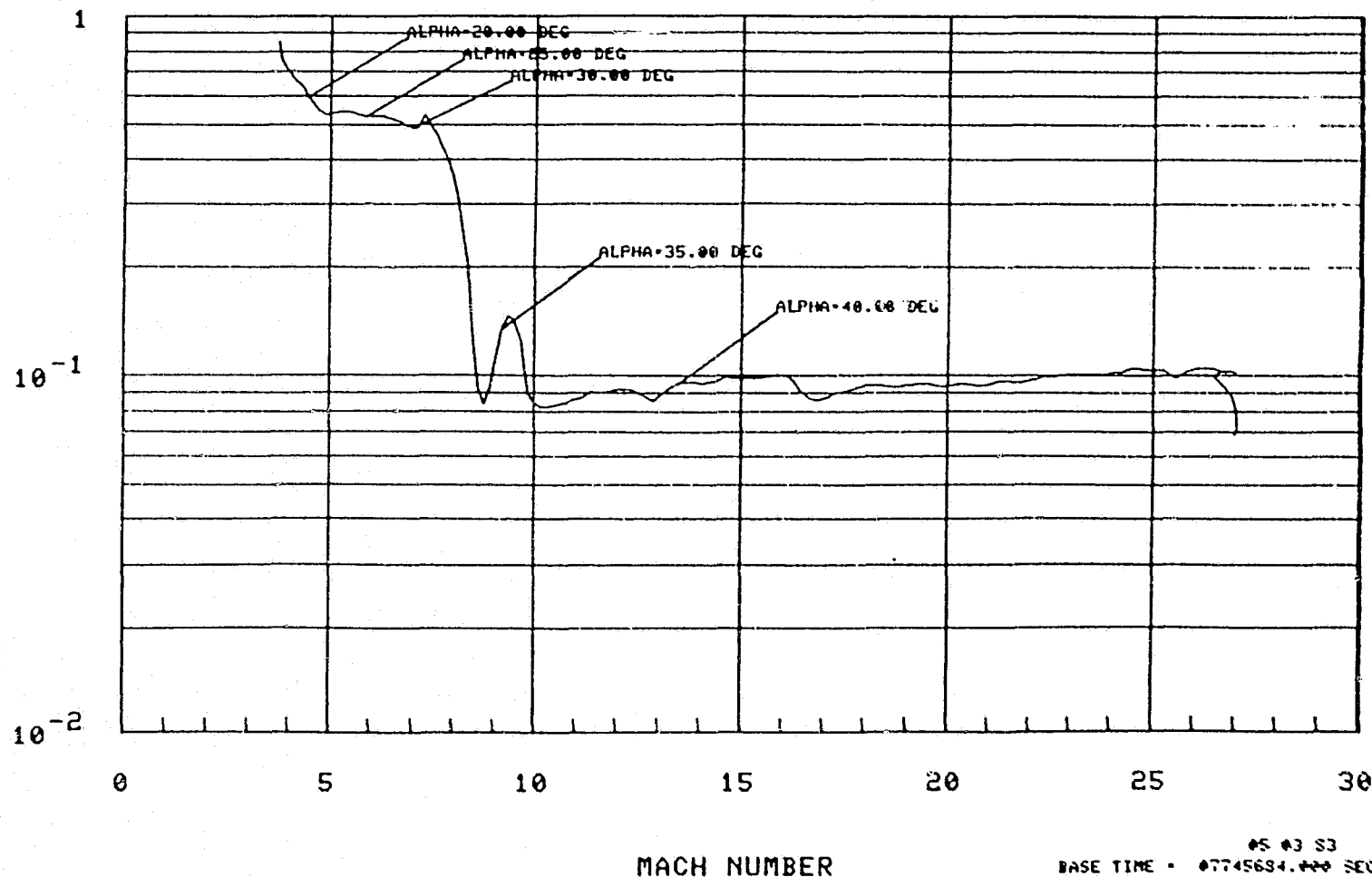


STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U0719670A/H-REF 200-1320 SEC

FILE C0011 - H/H-REF

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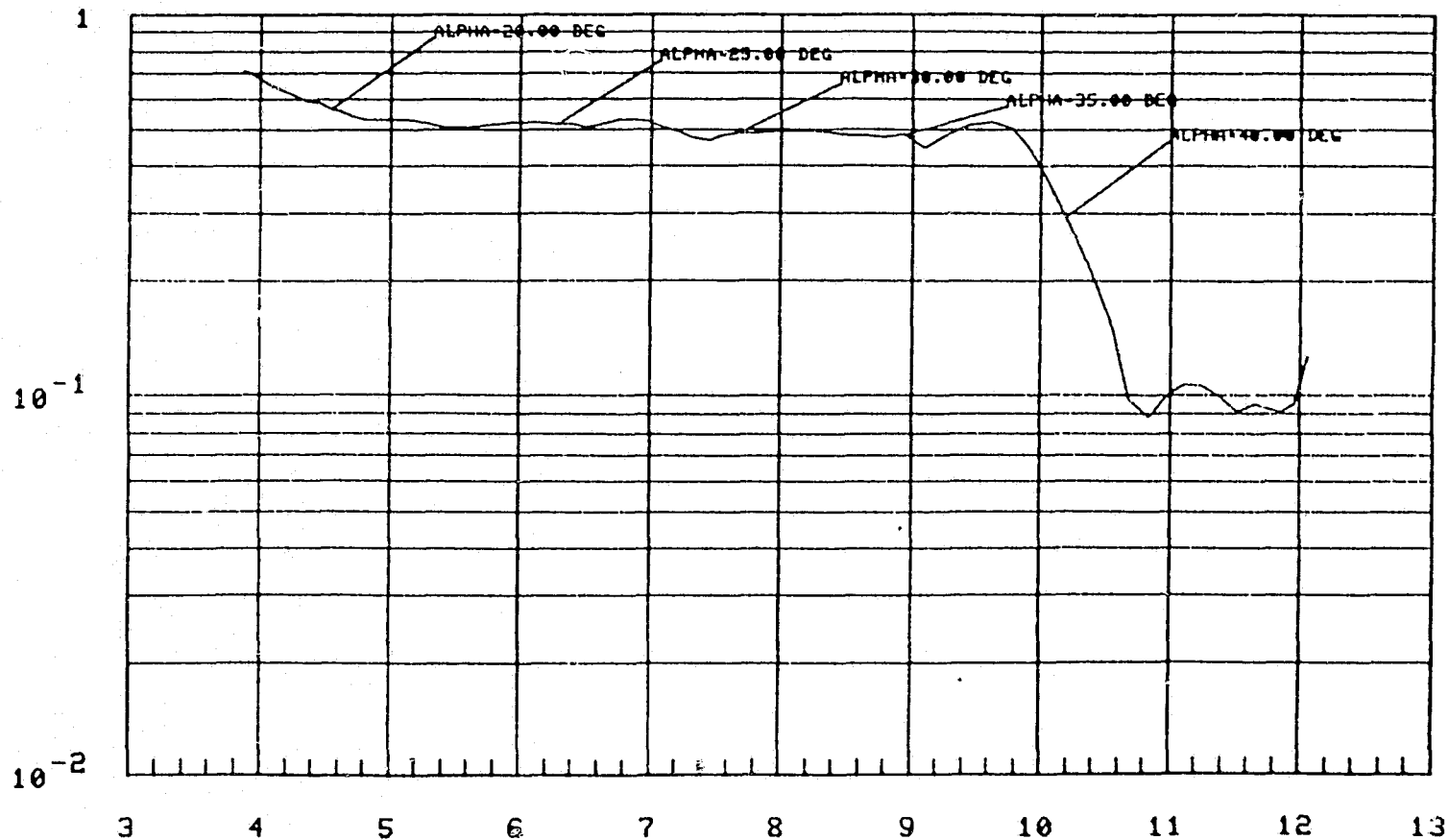
B-83

STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

U07T9670A/H-REF 965-1300 SEC

LINE COULDN'T BE DRAWN

ORIGINAL PAGE IS
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MACH NUMBER

05.03 S3
BASE TIME = 16040423.000 SEC.

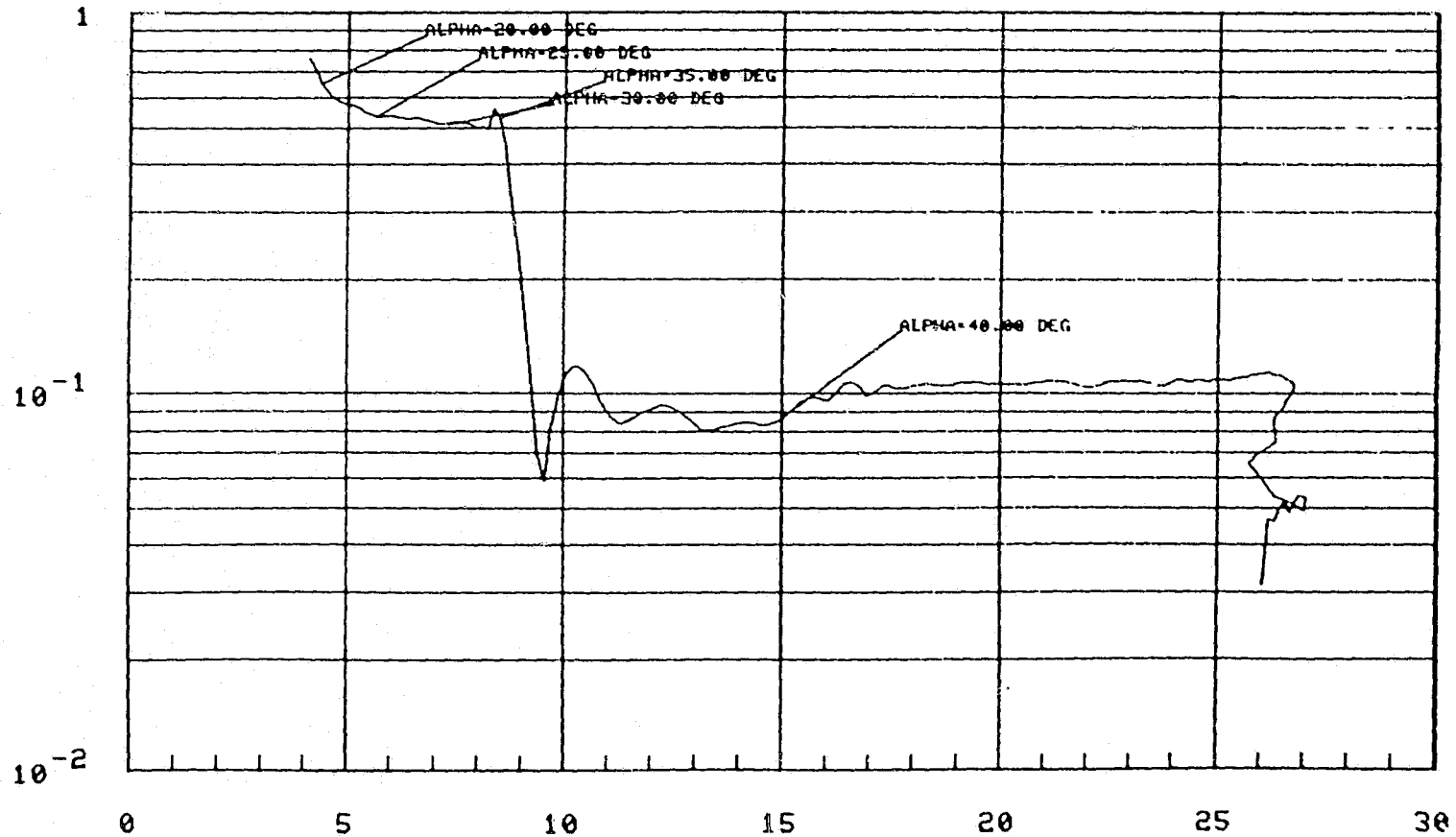
B-84

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

U07T9670A/H-REF 150-1350 SEC

B-85

LINE COUNT - H/H-2000



MACH NUMBER

05-03 S3
BASE TIME - 27096591.000 SEC.

U.S. AIR FORCE
OF FORN COUNTRIES

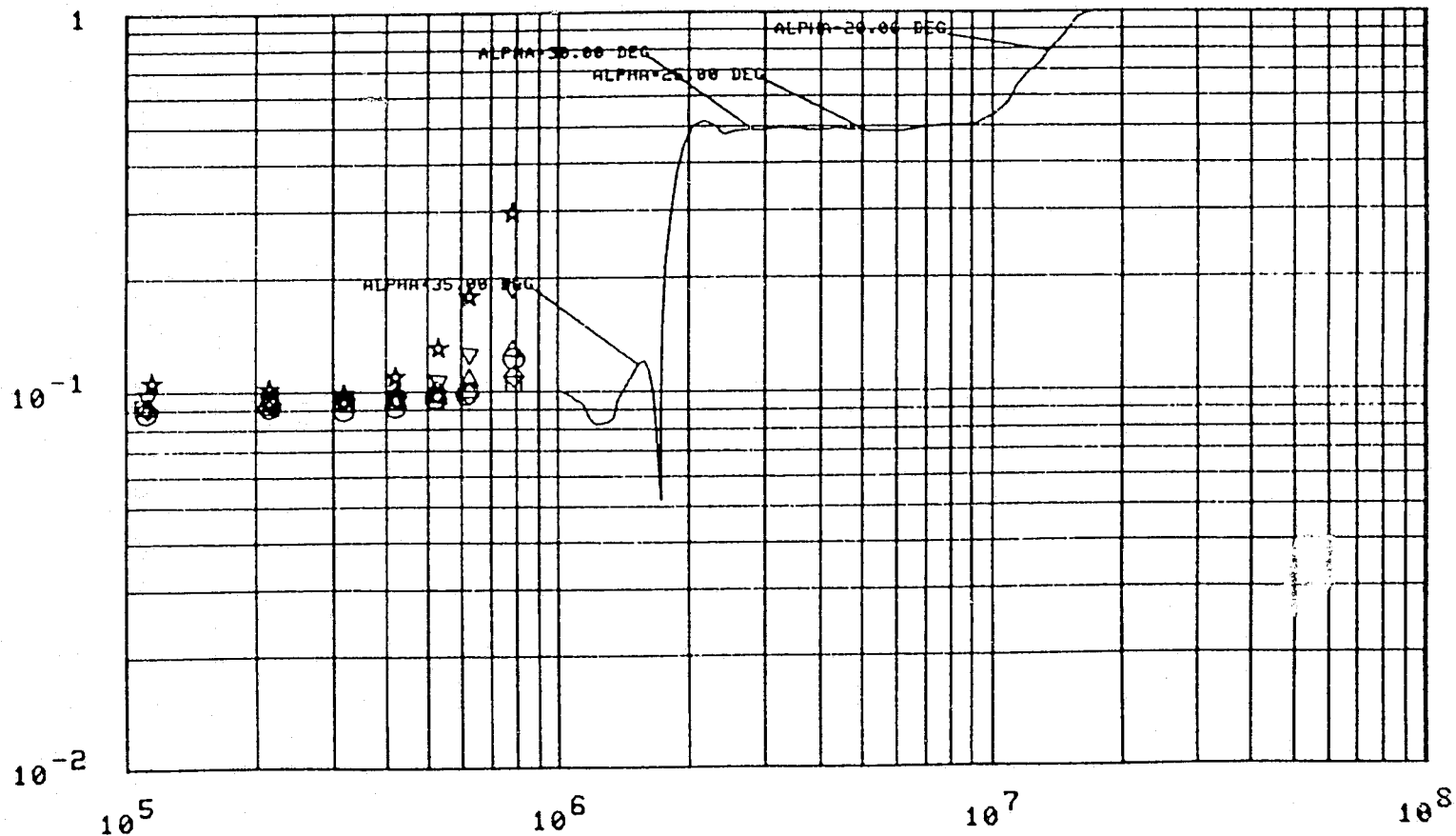
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U07T9670A/H-REF 1065-1460 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

FILE 000000 - H/H-0000



REYNOLDS NUMBER (NS)

05 03 '83
BASE TIME • 09049744.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

B-86

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.40

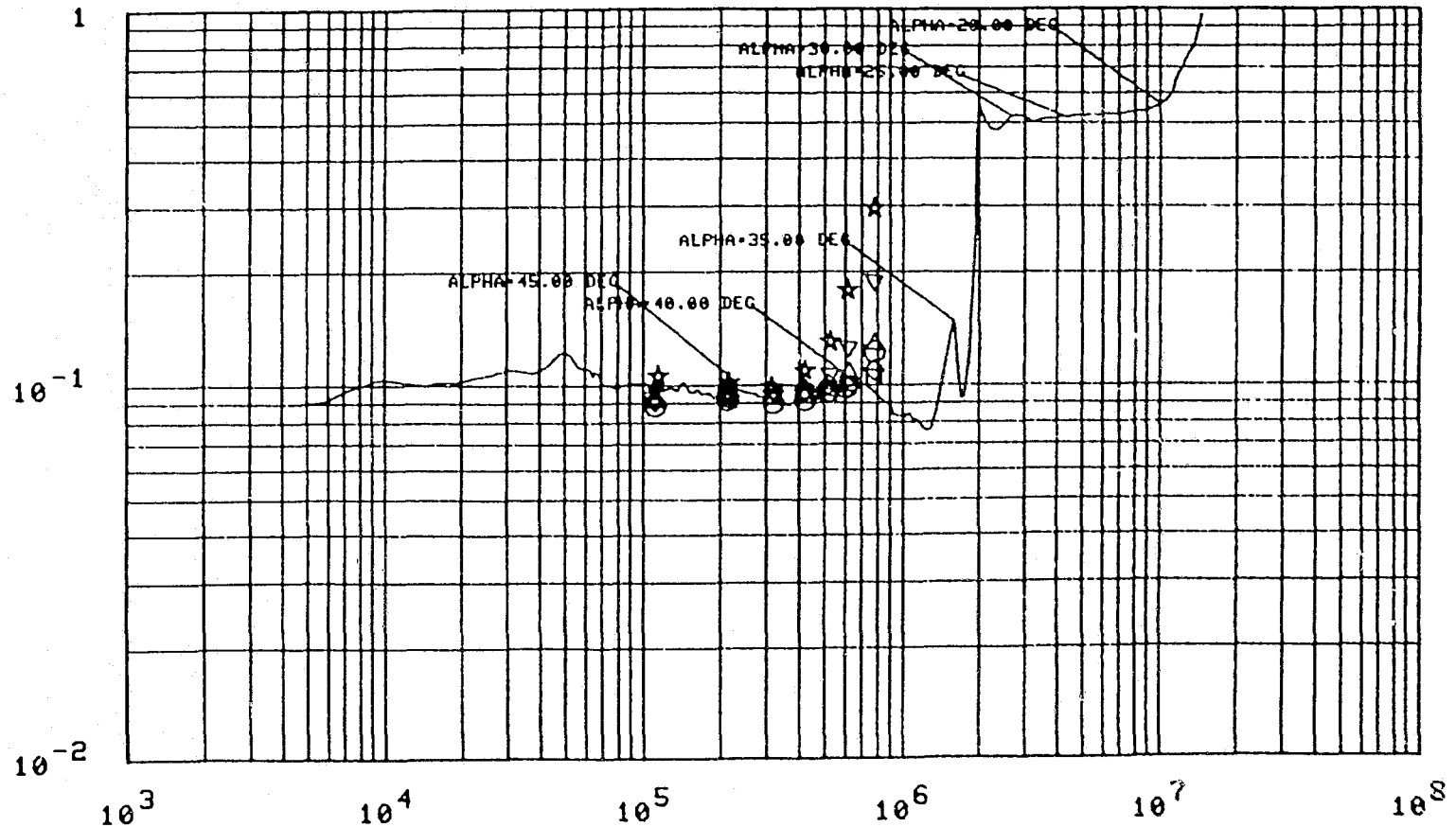
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9670A/H-REF 200-1480 SEC

WING COEFFICIENT - I/I-REF

ORIGINAL PAGE IS
OF POOR QUALITY



REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME = 275502.000 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.40

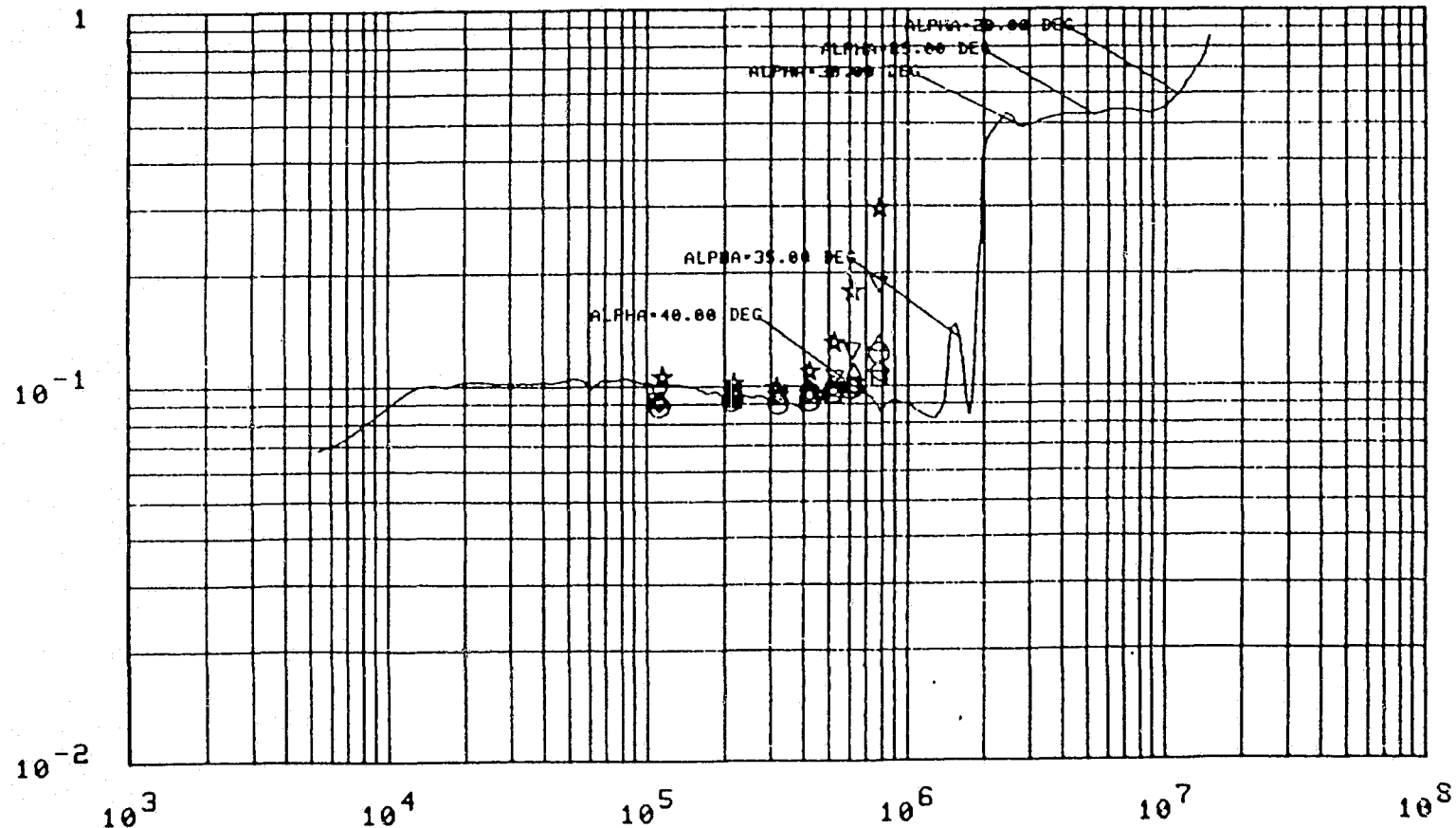
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9670A/H-REF 200-1380 SEC

LINE CODEL - H/H-REF

B-88



ORIGINAL PAGE IS
OF POOR QUALITY

REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME • 07745654.000 SEC.

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.40

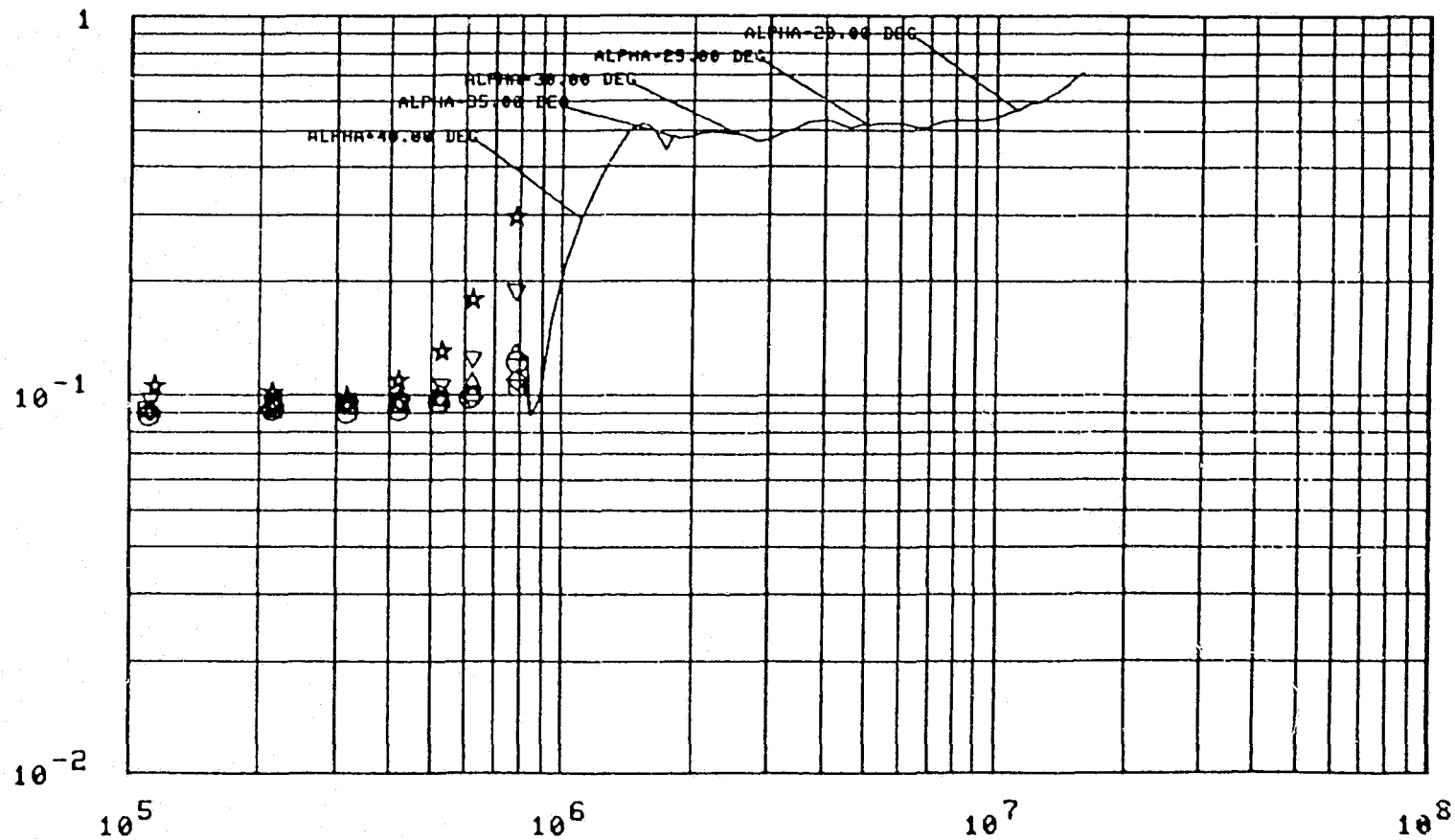
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★

OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9670A/H-REF 965-1300 SEC

FILE C000000 - I/I-RUE

B-89



ORIGINAL PAGE IS
OF POOR QUALITY

REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME • 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

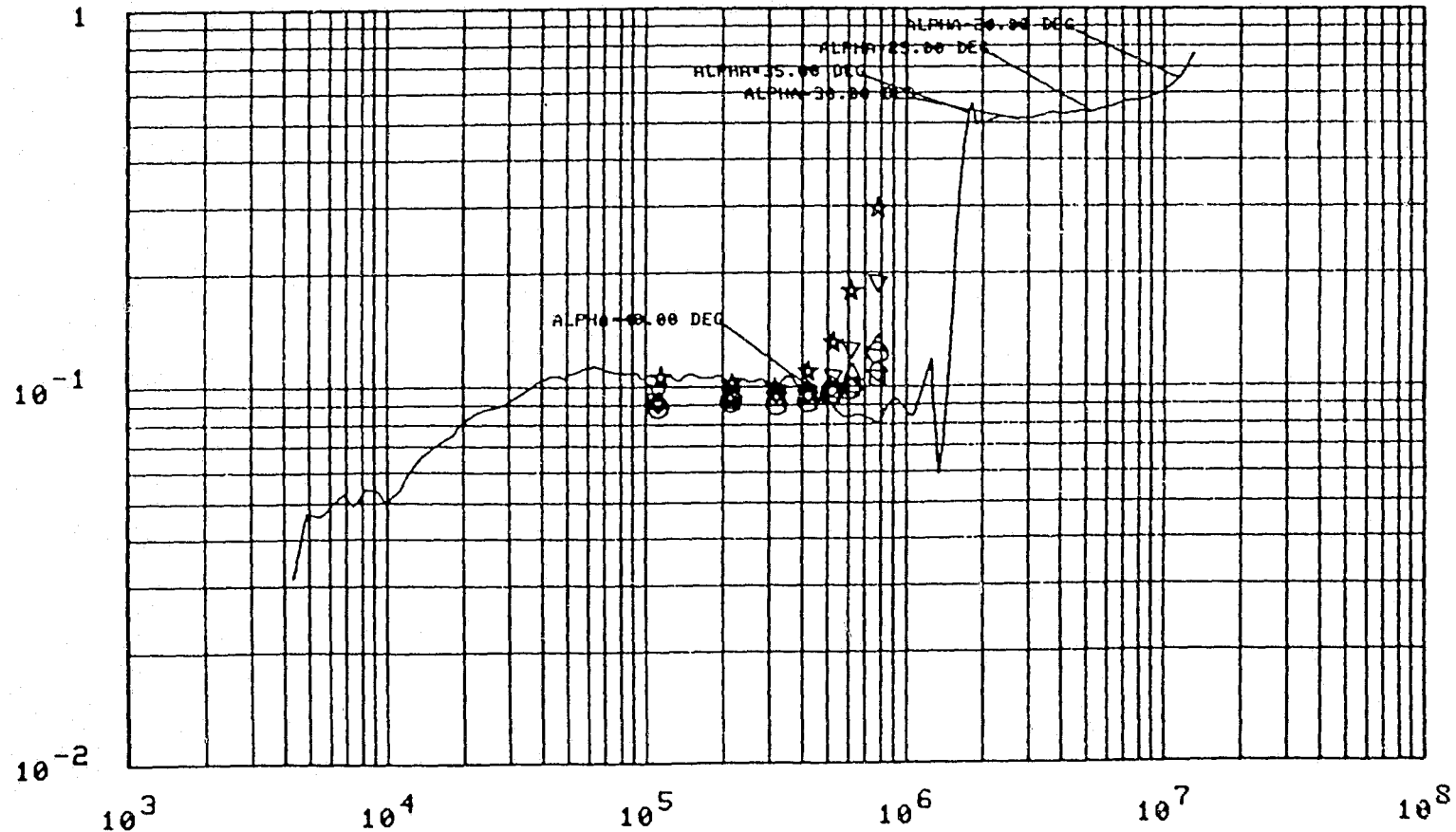
U07T9670A/H-REF 150-1350 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

WING COEFFICIENT - H/H_{REF}

B-90



REYNOLDS NUMBER (NS)

AS #3 S3
BASE TIME • 27698591.000 SEC.

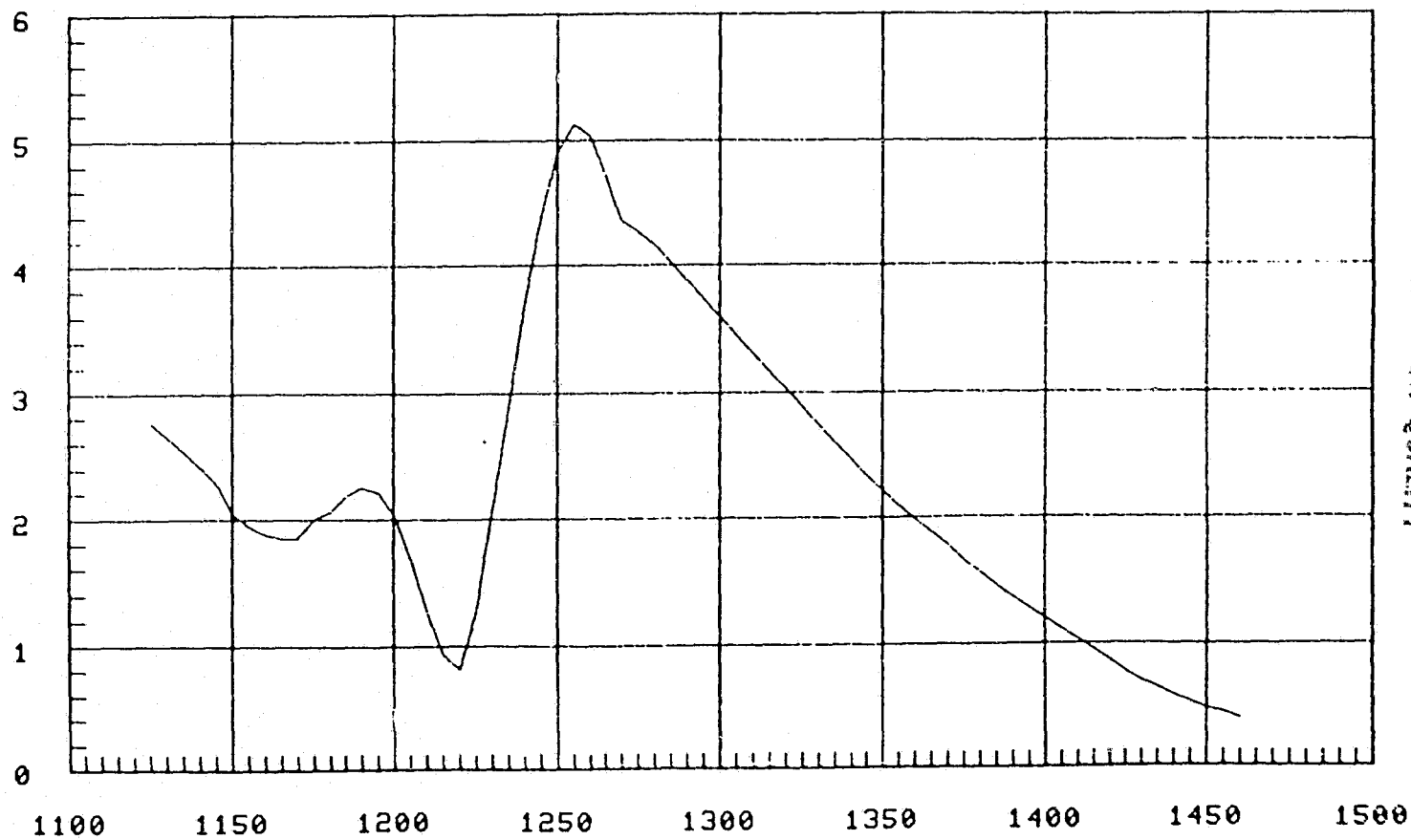
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STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

U07T9670A

FEEDING RATE - BULLETS - SEC

ORIGINAL P. 22 IS
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TIME - SECONDS

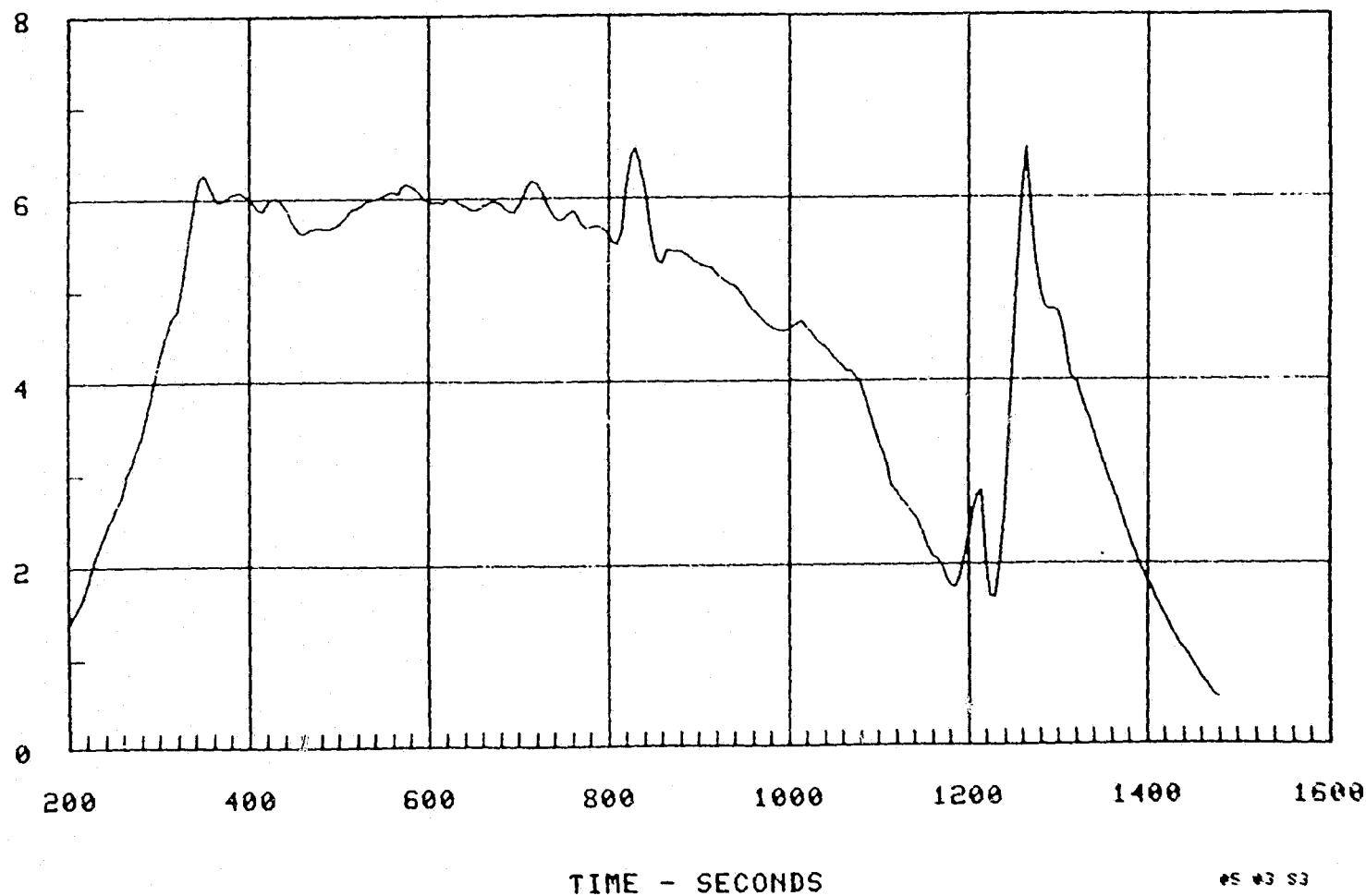
05 03 53

B-91

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U87T9670A

HEATING RATE - BULB TEMPERATURE - SEC



B-92

ORIGINAL PAGE IS
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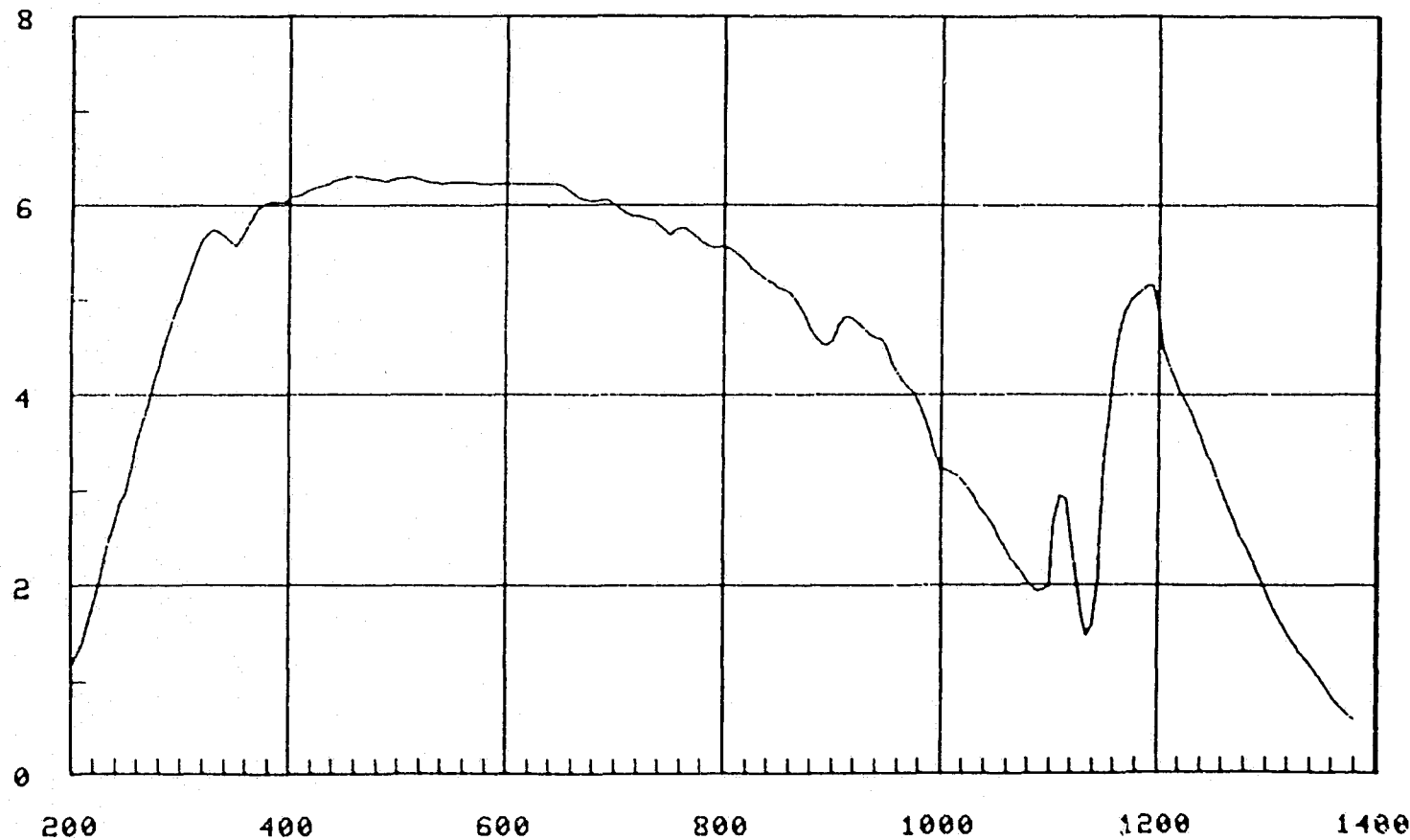
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STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U07T9670A

FLIGHTING RATE - BURNING - SEC

B-93



TIME - SECONDS

#5 #3 S3

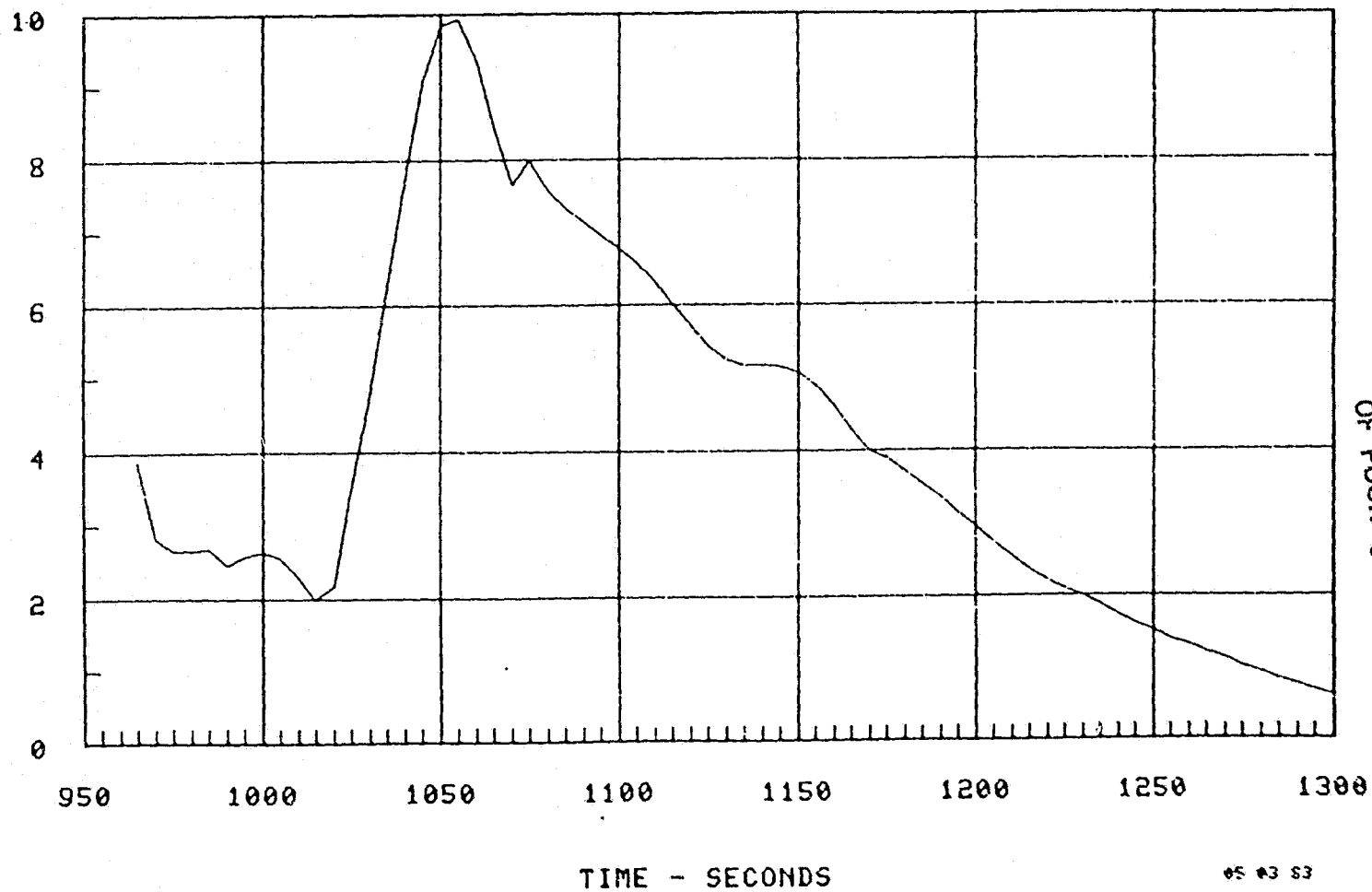
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U0779678A

HEADLINE RATE - B/C/E/L/X/S - SMC

B-94



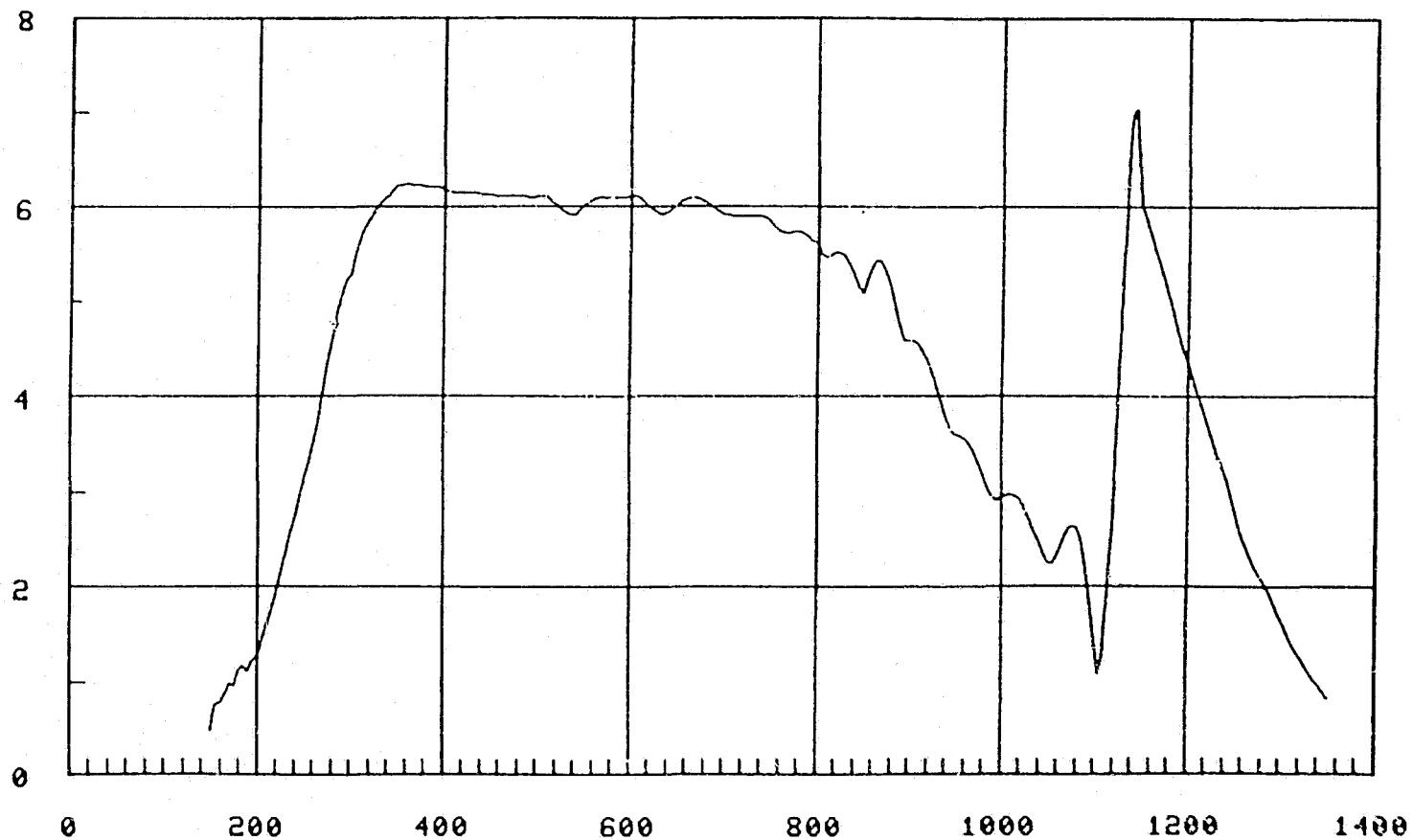
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05 03 53

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U87T9670A

HEATING RATE :: BTU/FT**2 :: SEC



TIME - SECONDS

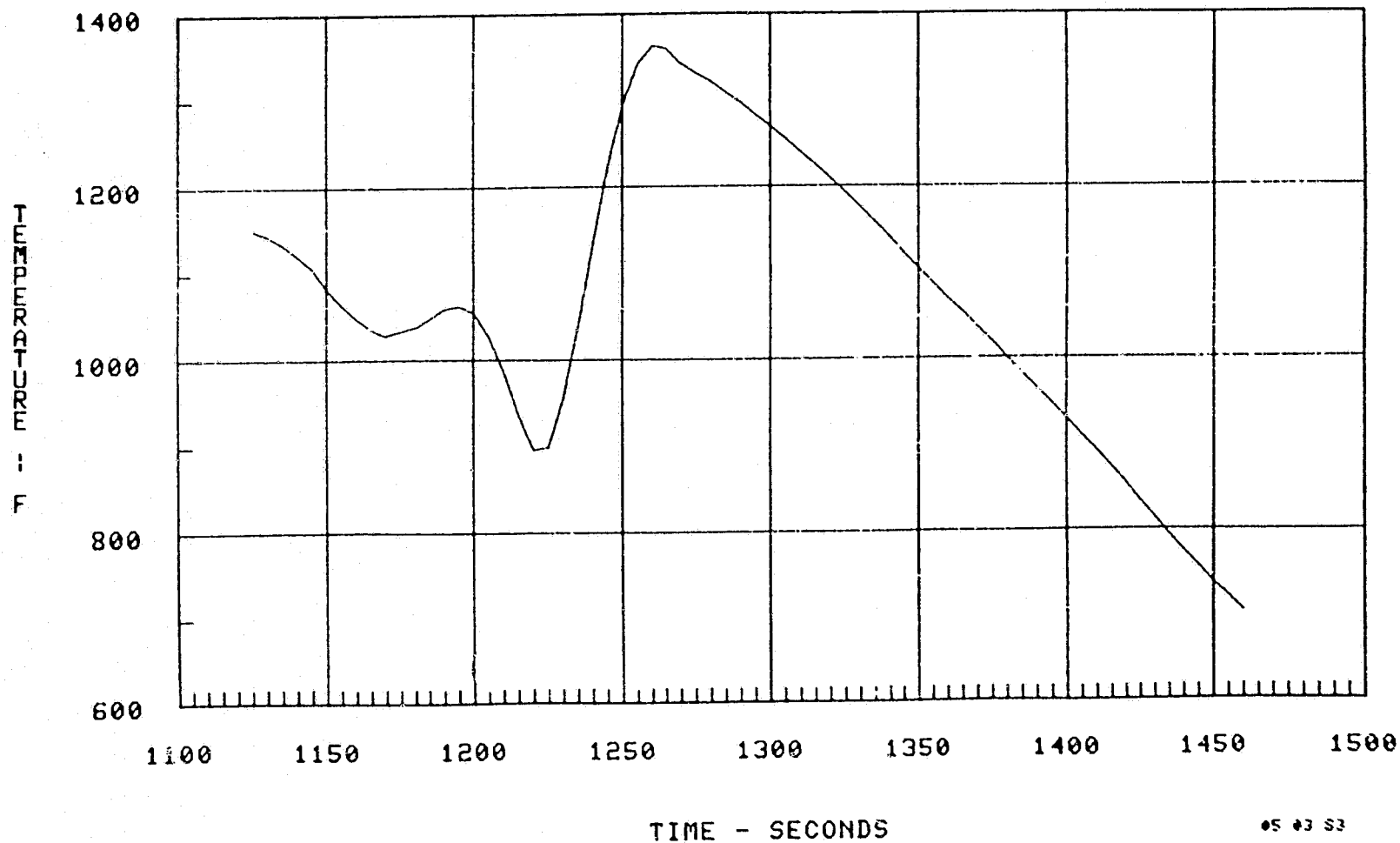
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B-95

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

U67T9670A

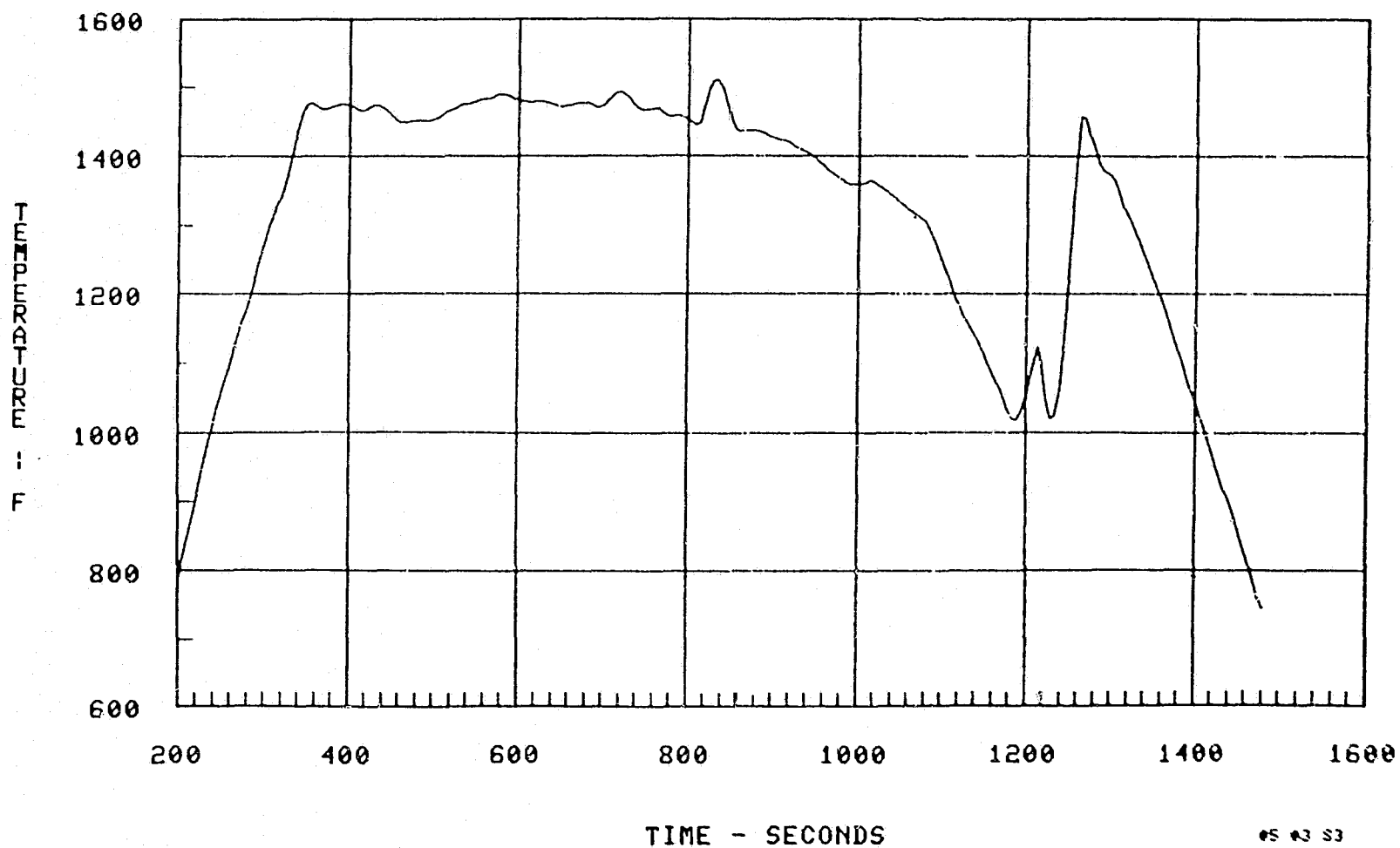


B-96

ORIGINAL PAGE IS
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STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

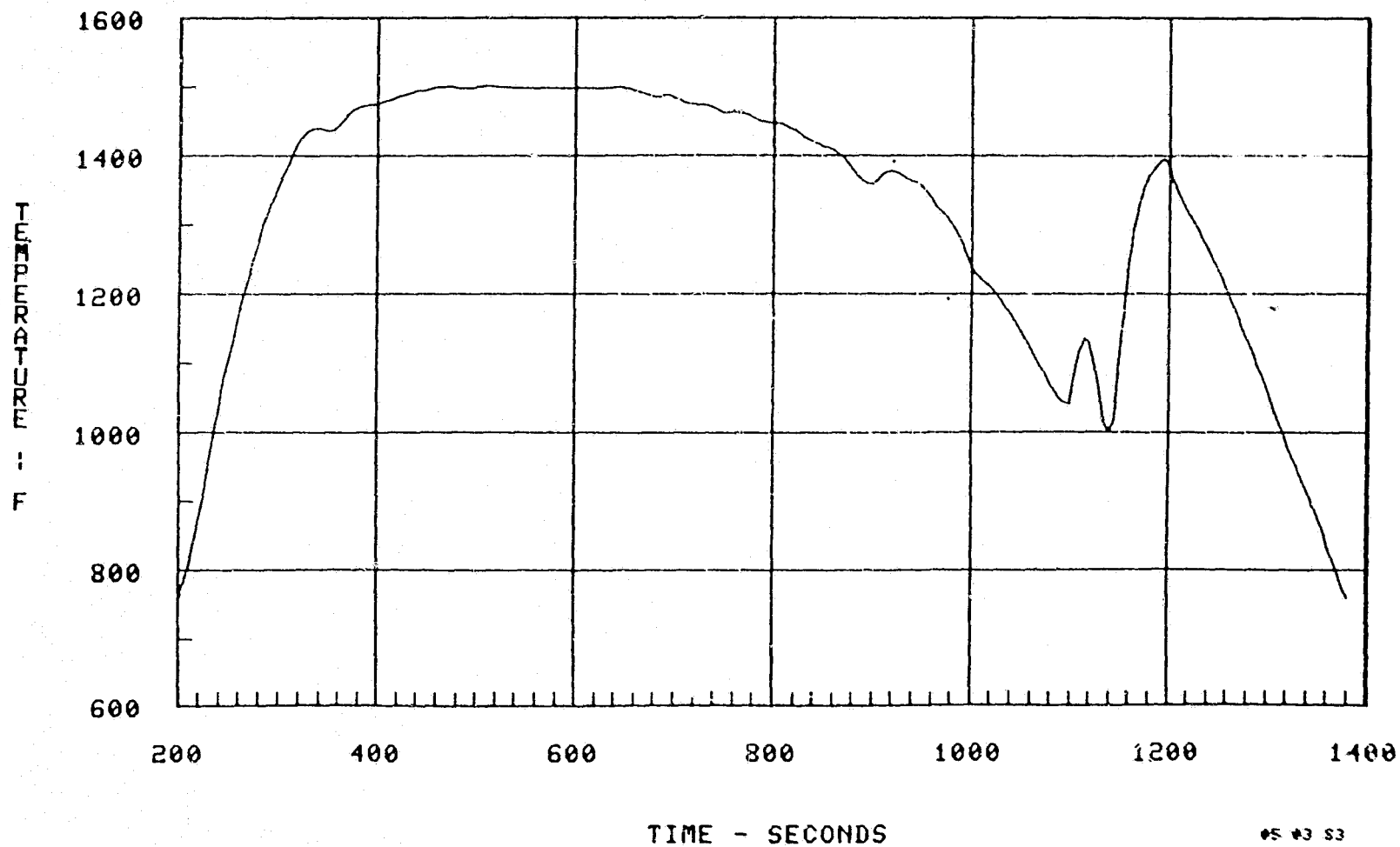
U07T9670A



City

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.40$

U07T9670A

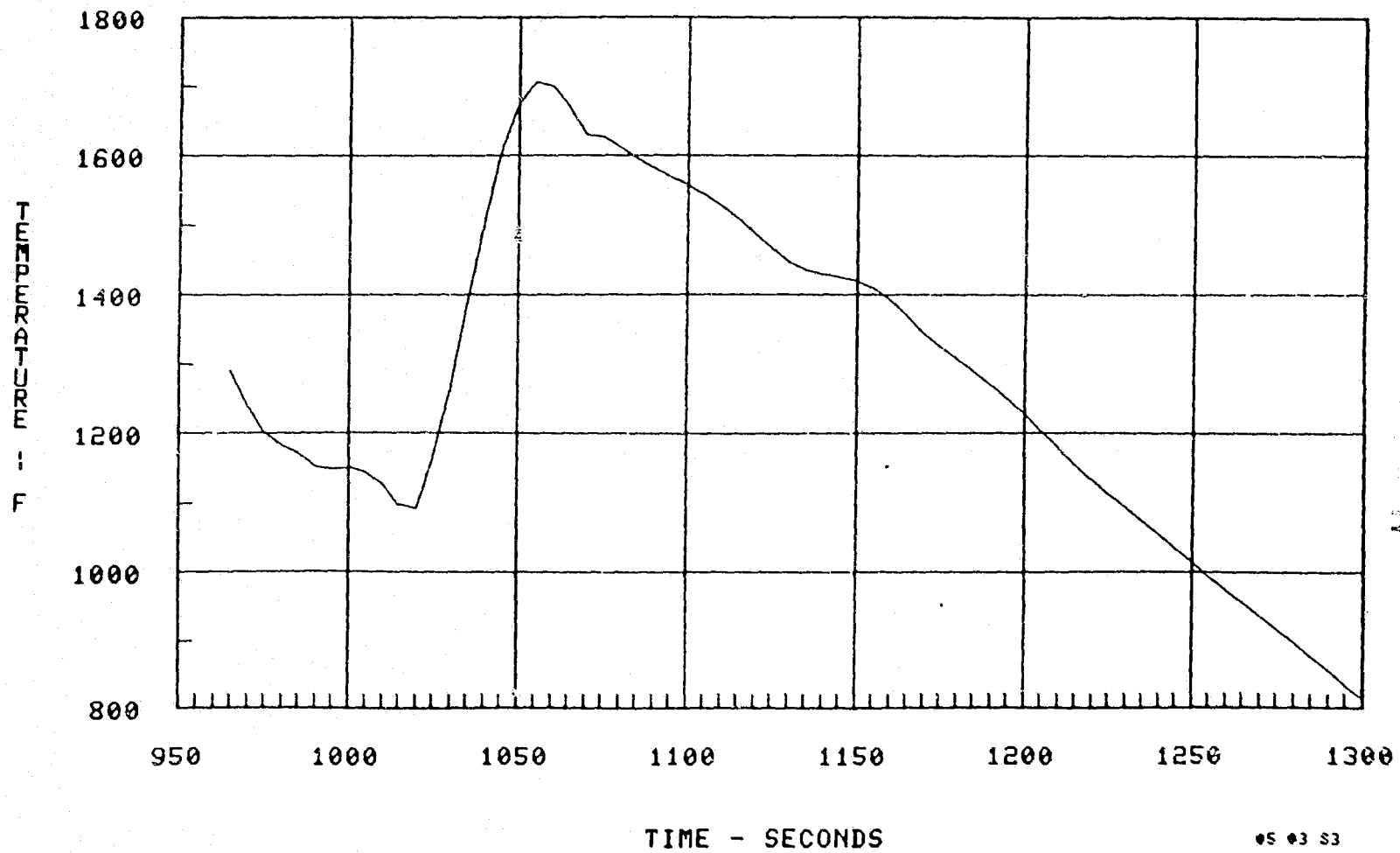


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B-98

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U07T9670A

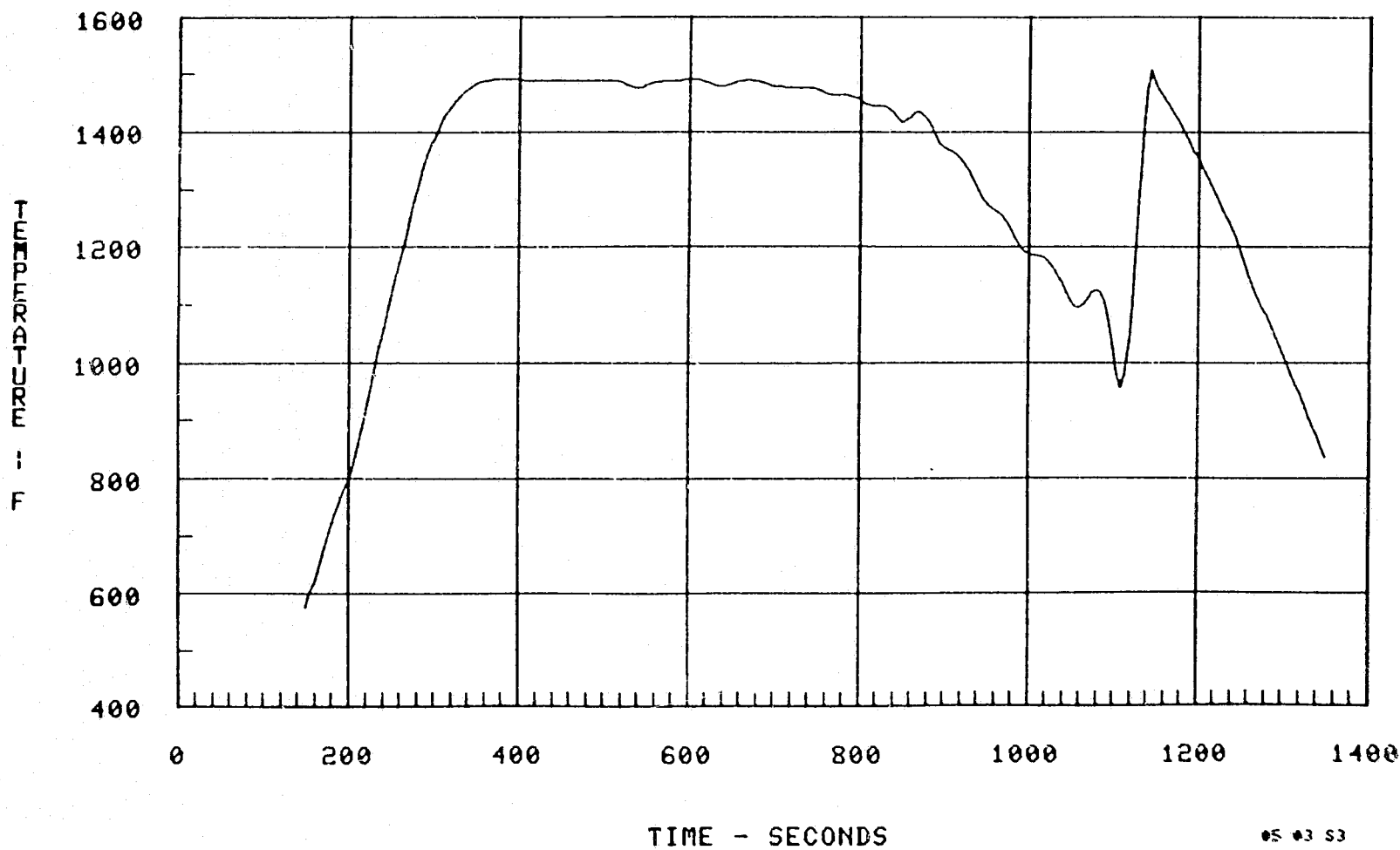


B-99

ORIGINAL COPY IS
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STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.40

U07T9670A



ORIGINAL PAGE IS
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STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.50

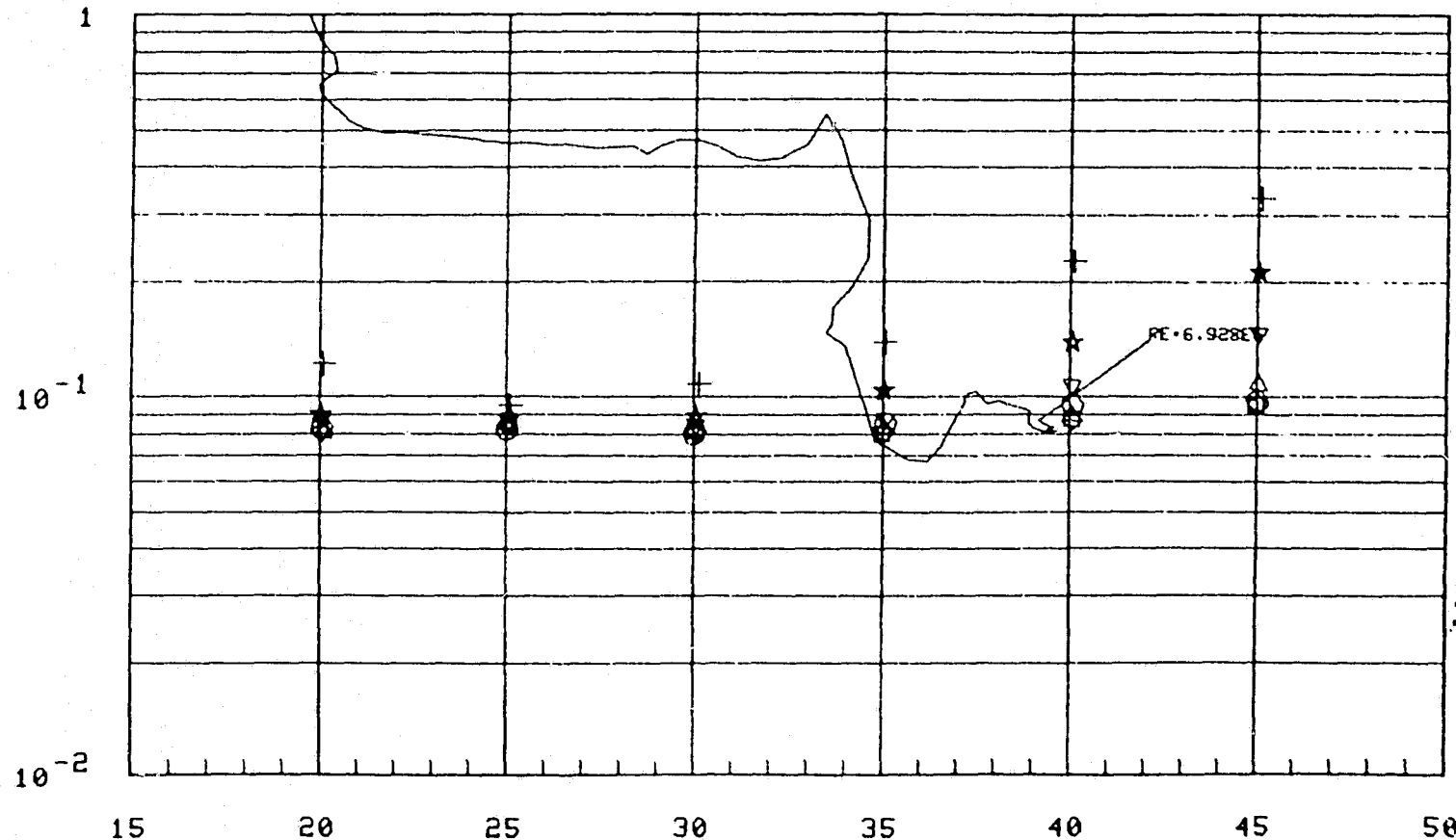
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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9671A/H-REF 1065-1460 SEC

FILE COUNT - H/H-REF

B-101



ORIGINAL DATA IS
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ANGLE-OF-ATTACK - DEG

BASE TIME * 09049744.000 SEC.

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.50

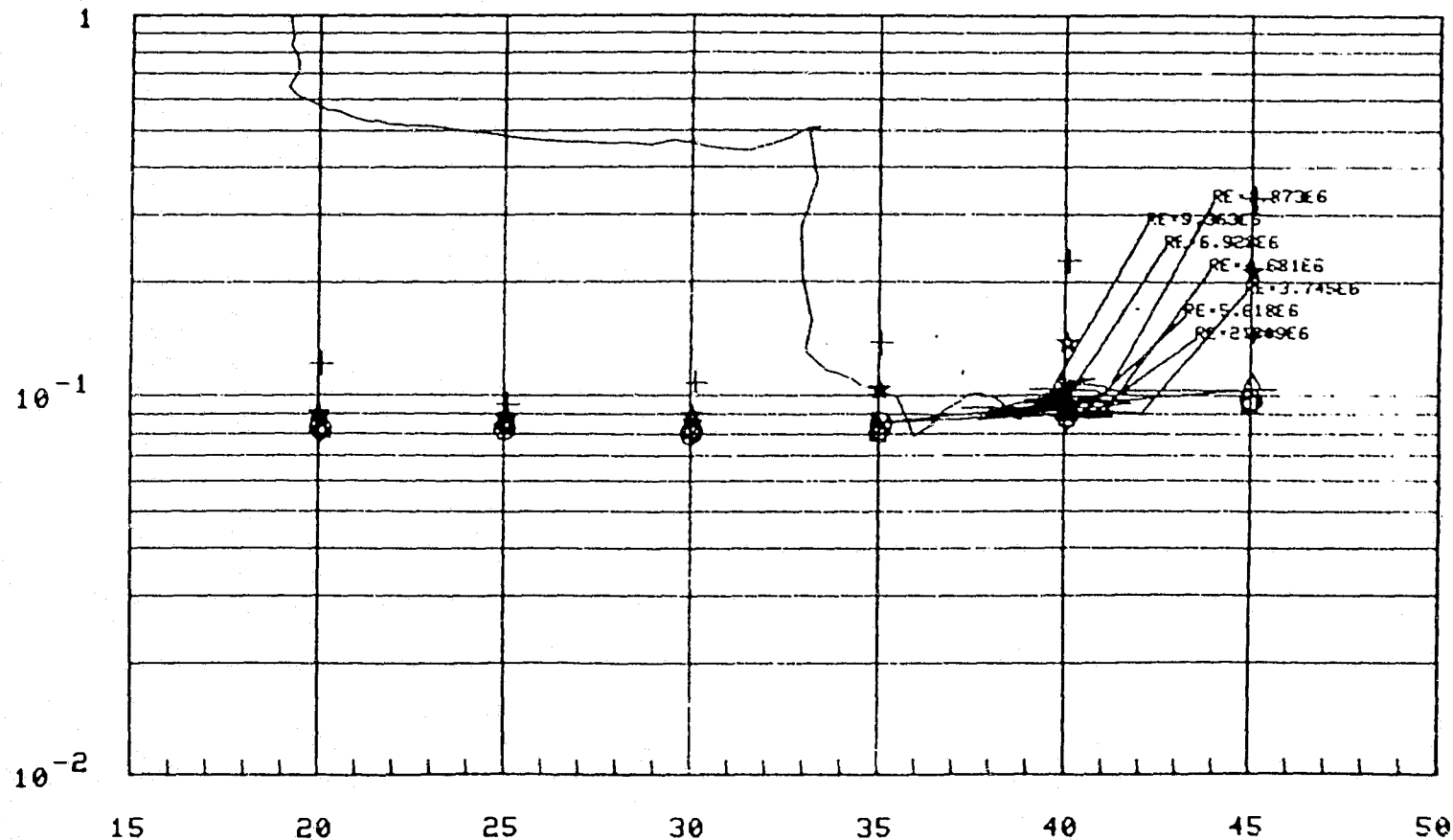
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9671A/H-REF 200-1480 SEC

FILE COWELL - H/H-QUIL

B-102



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ANGLE-OF-ATTACK - DEG

BASE TIME = 27550236.000 SEC.

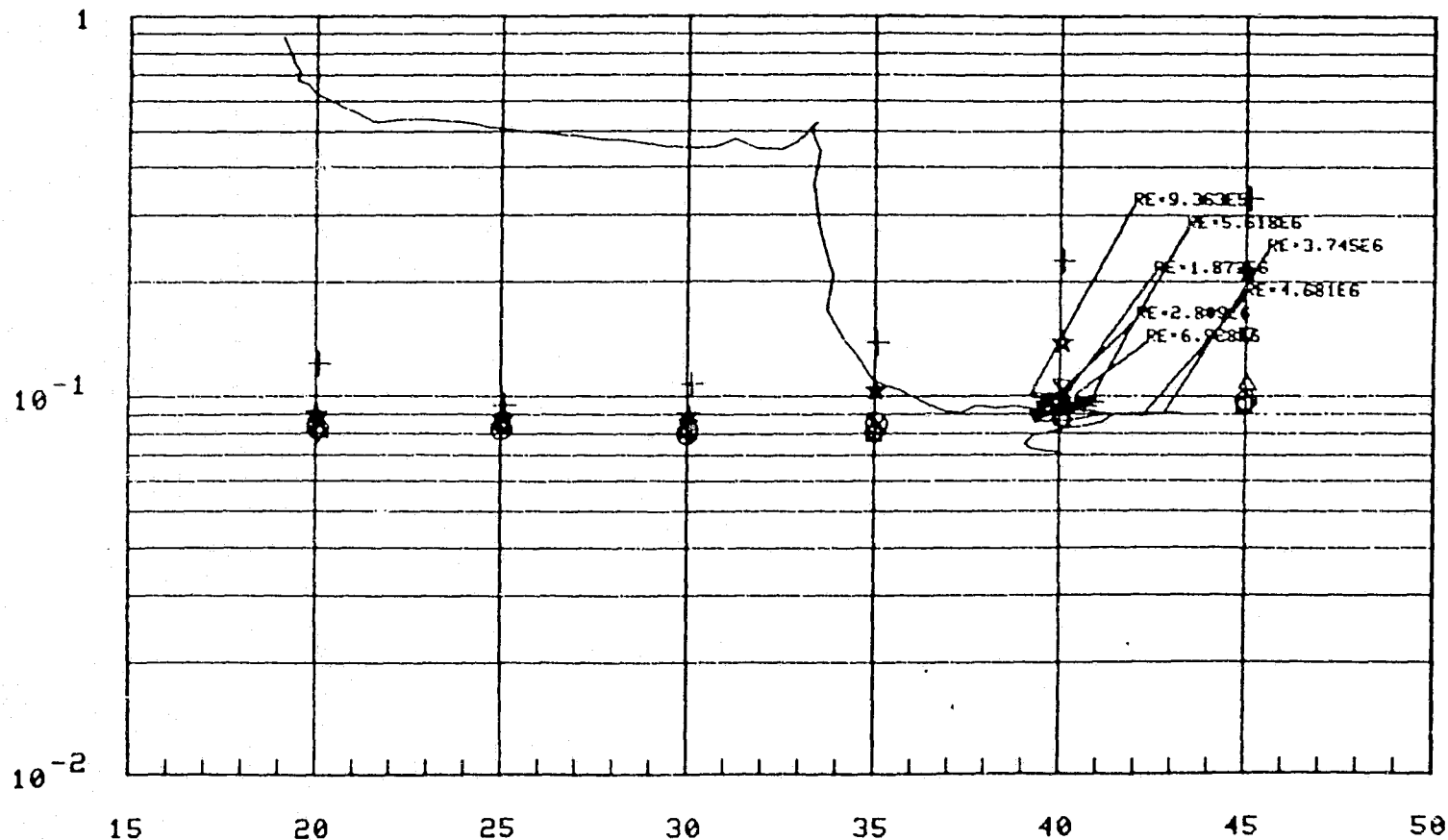
STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.50

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9671A/H-REF 200-1320 SEC

LINE CODE -- H-I-R-UL



ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME = 077456S4.000 SEC.

ORIGINAL PHOTO COPY
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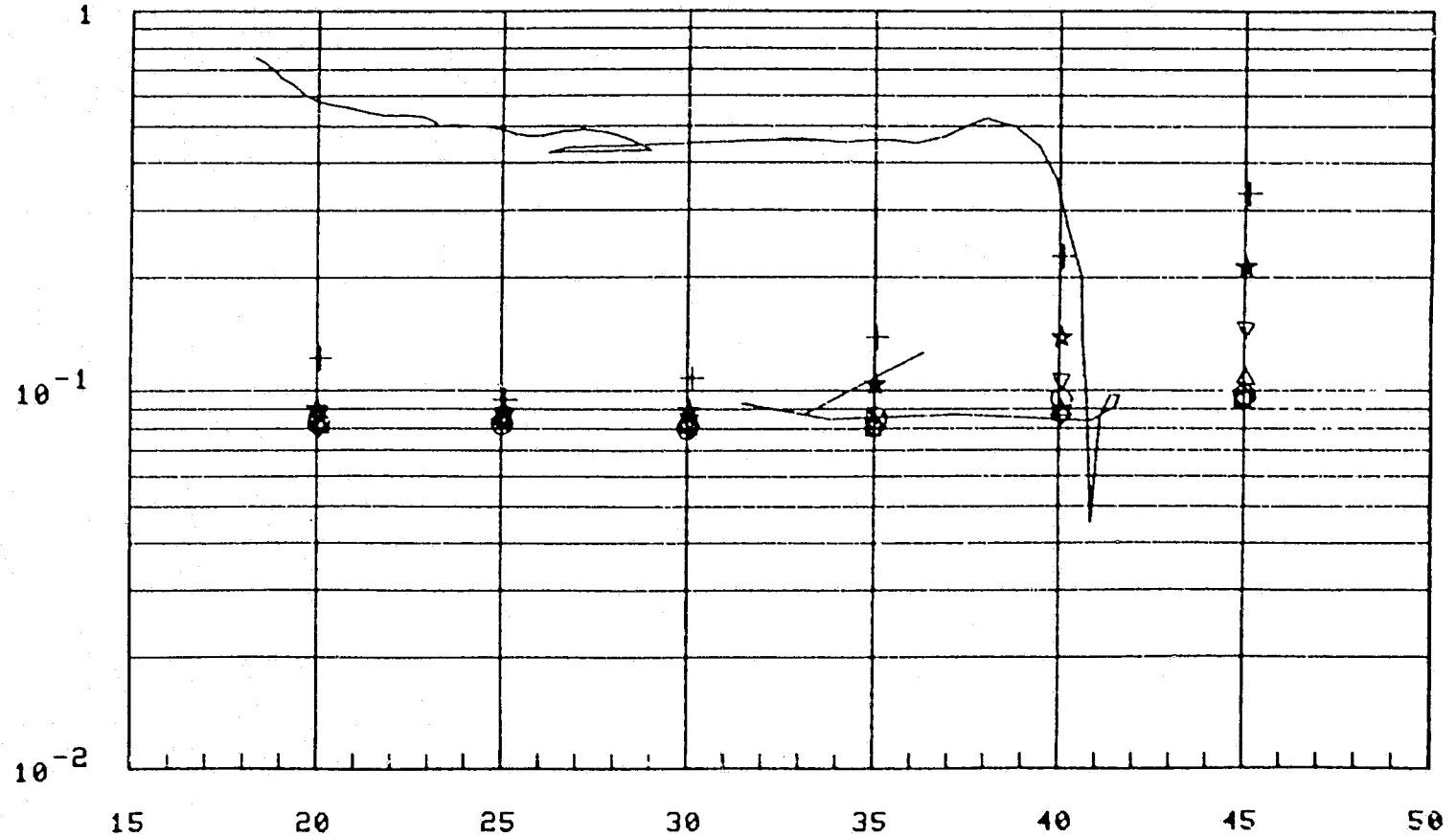
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.50

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9671A/H-REF 965-1300 SEC

FILE COWELL - H/H-REF



ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME * 16040423.000 SEC.

B-104

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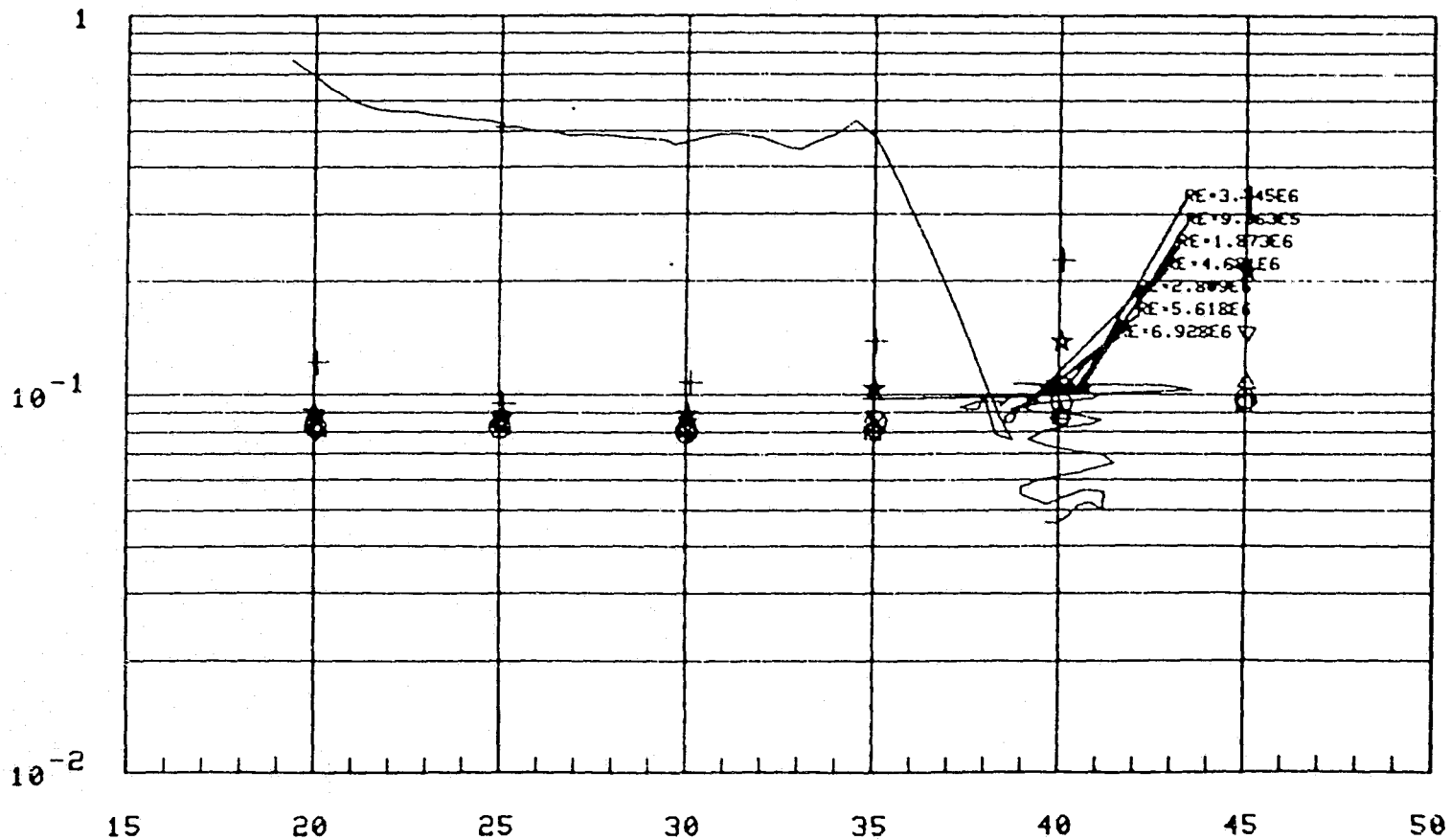
STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.50

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9671A/H-REF 150-1350 SEC

LINE COULDN'T BE DRAWN



ORIGINAL PAGE IS
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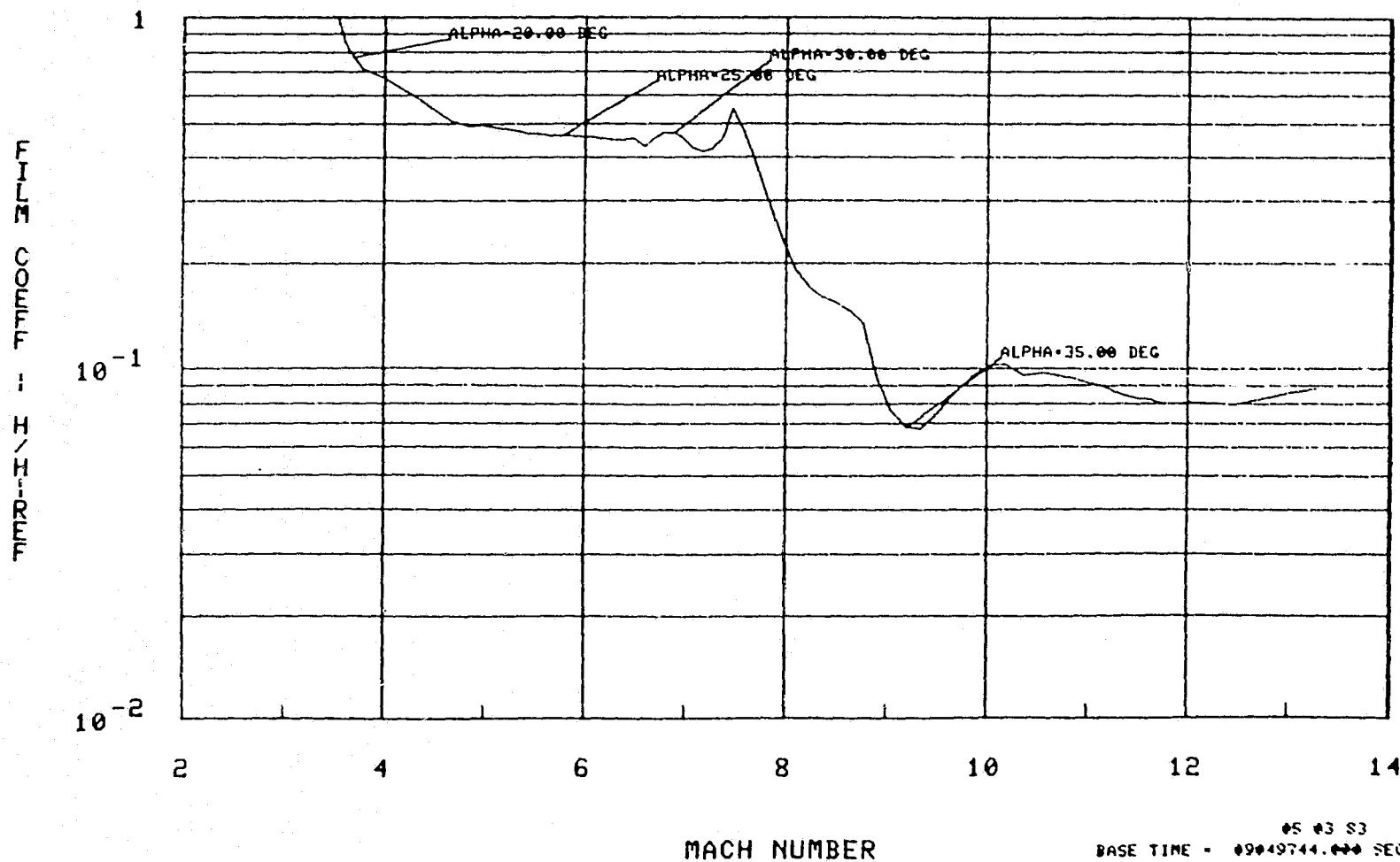
B-105

ANGLE-OF-ATTACK - DEG

BASE TIME = 27695591.000 SEC.

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

U07T9671A/H-REF 1065-1460 SEC

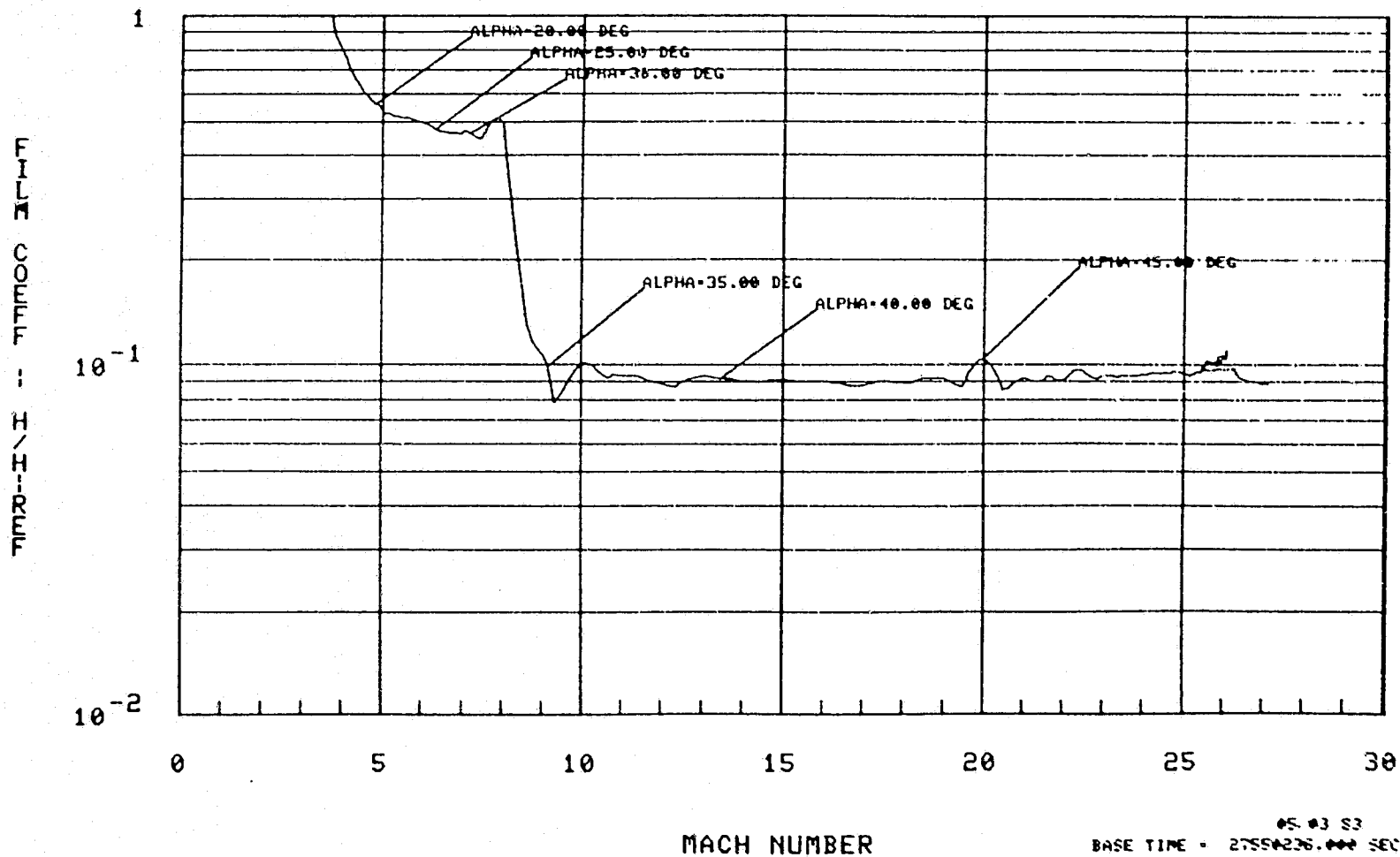


3-106

ORIGINAL PAGE IS
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STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

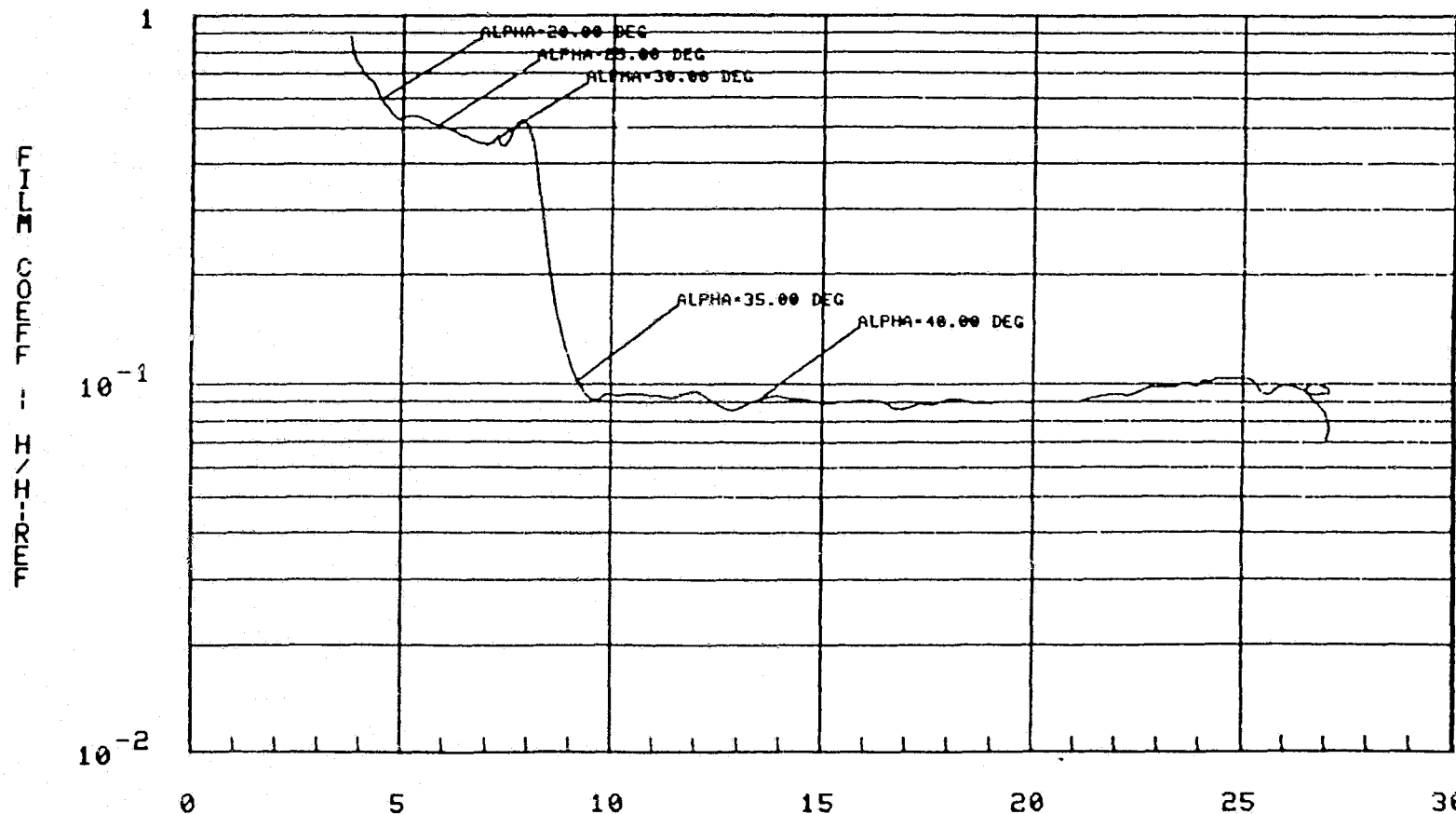
U07T9671A/H-REF 200-1480 SEC



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STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U07T9671A/H-REF 200-1380 SEC



B-108

LIFT COEFFICIENT - C_L

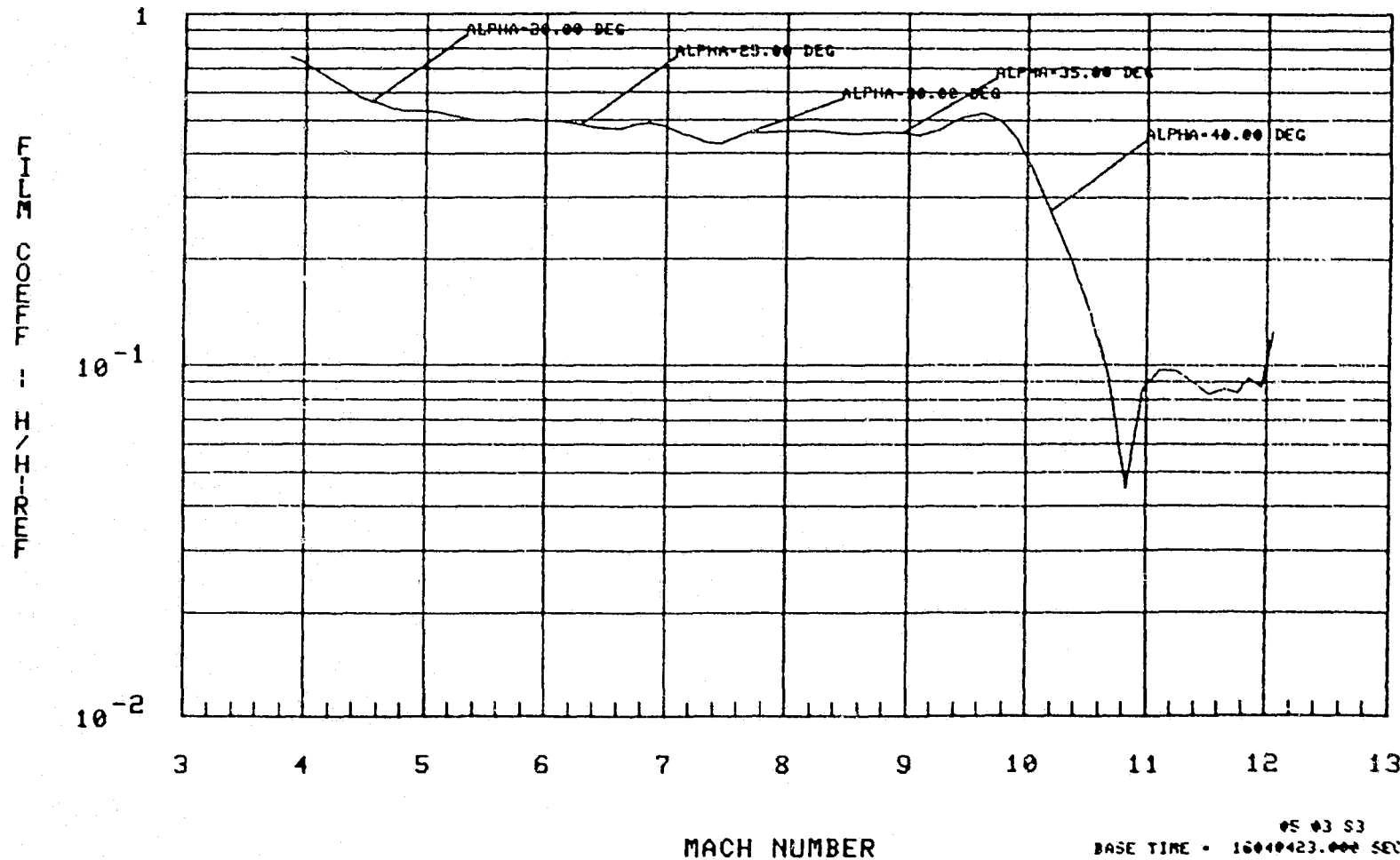
MACH NUMBER

05 03 S3
BASE TIME - 077456S4.000 SEC.

ORIGINAL PAGE IS
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STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U07T9671A/H-REF 965-1300 SEC

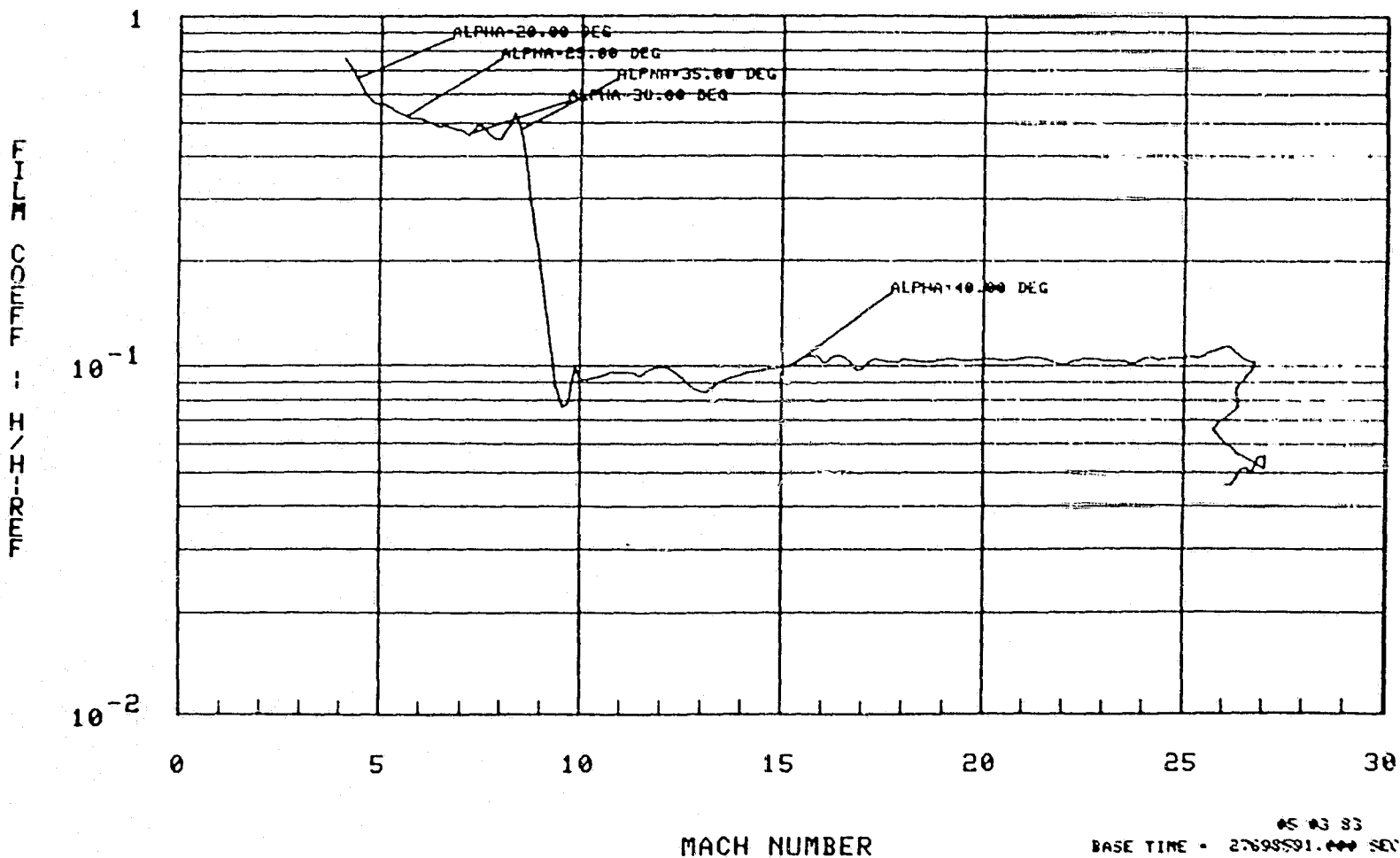


B-109

ORIGINAL PAGE IS
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STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

U07T9671A/H-REF 150-1350 SEC



B-110

ORIGINAL PAGE IS
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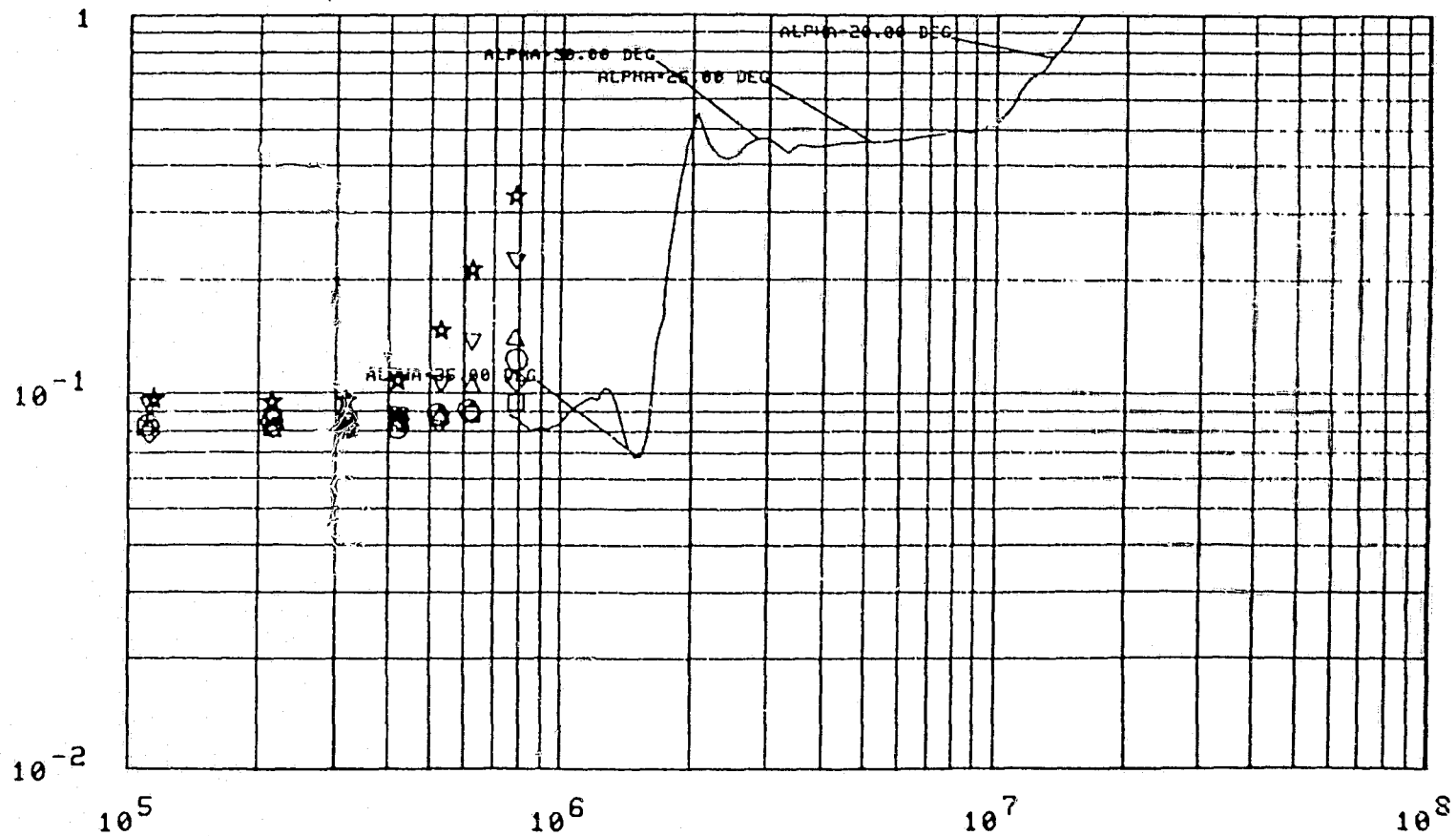
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9671A/H-REF 1065-1460 SEC

FILE CODE: H-H-RUL

B-111



REYNOLDS NUMBER (NS)

05-03 S3
BASE TIME • 09049744.000 SEC.

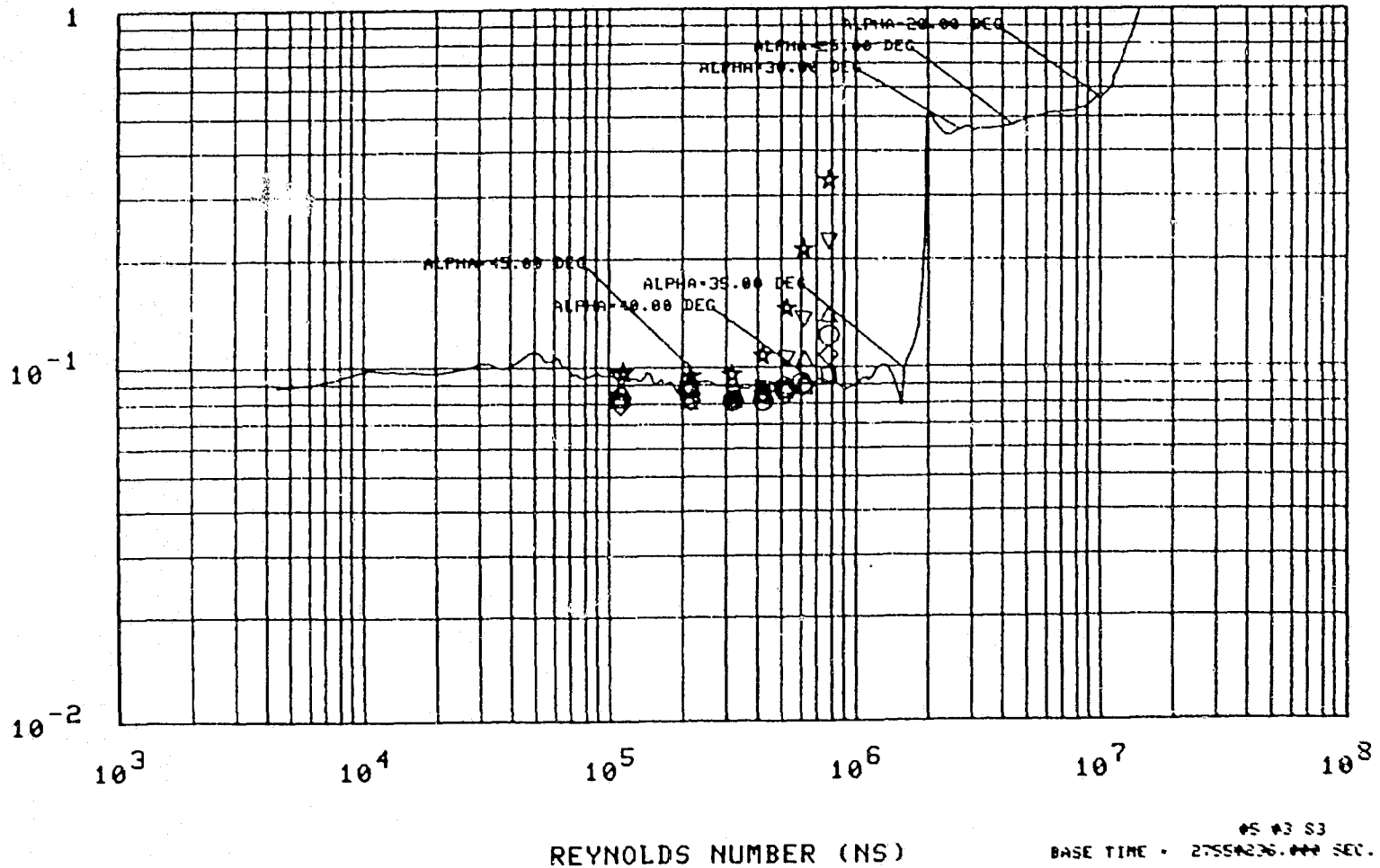
ORIGINAL PAGE IS
OF POOR QUALITY

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.50

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9671A/H-REF 200-1420 SEC



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STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.50

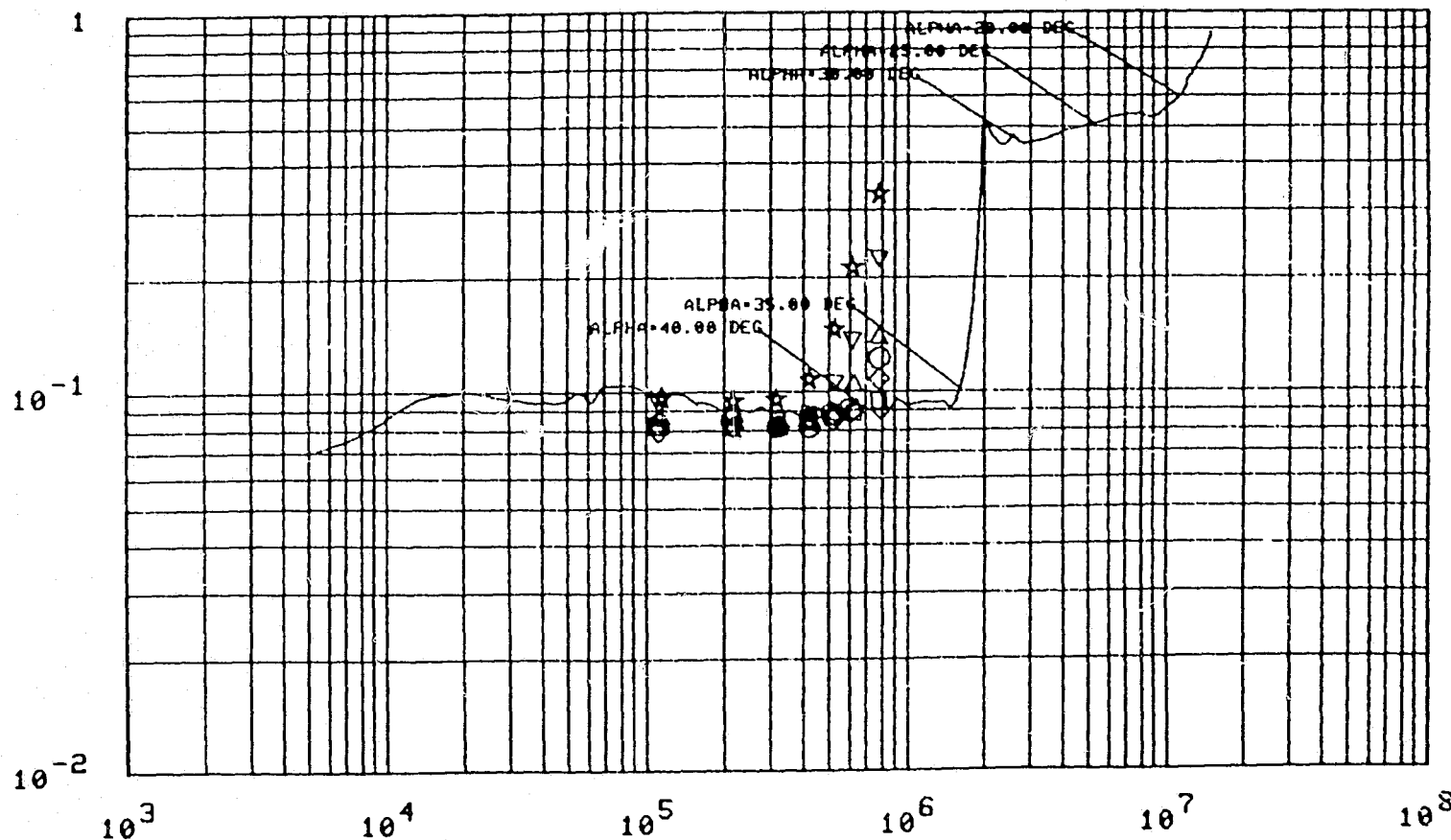
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9671A/H-REF 200-1380 SEC

FILE CODE: H/H-CELL

B-113



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REYNOLDS NUMBER (NS)

05-03-83
BASE TIME • 07745654.000 SEC.

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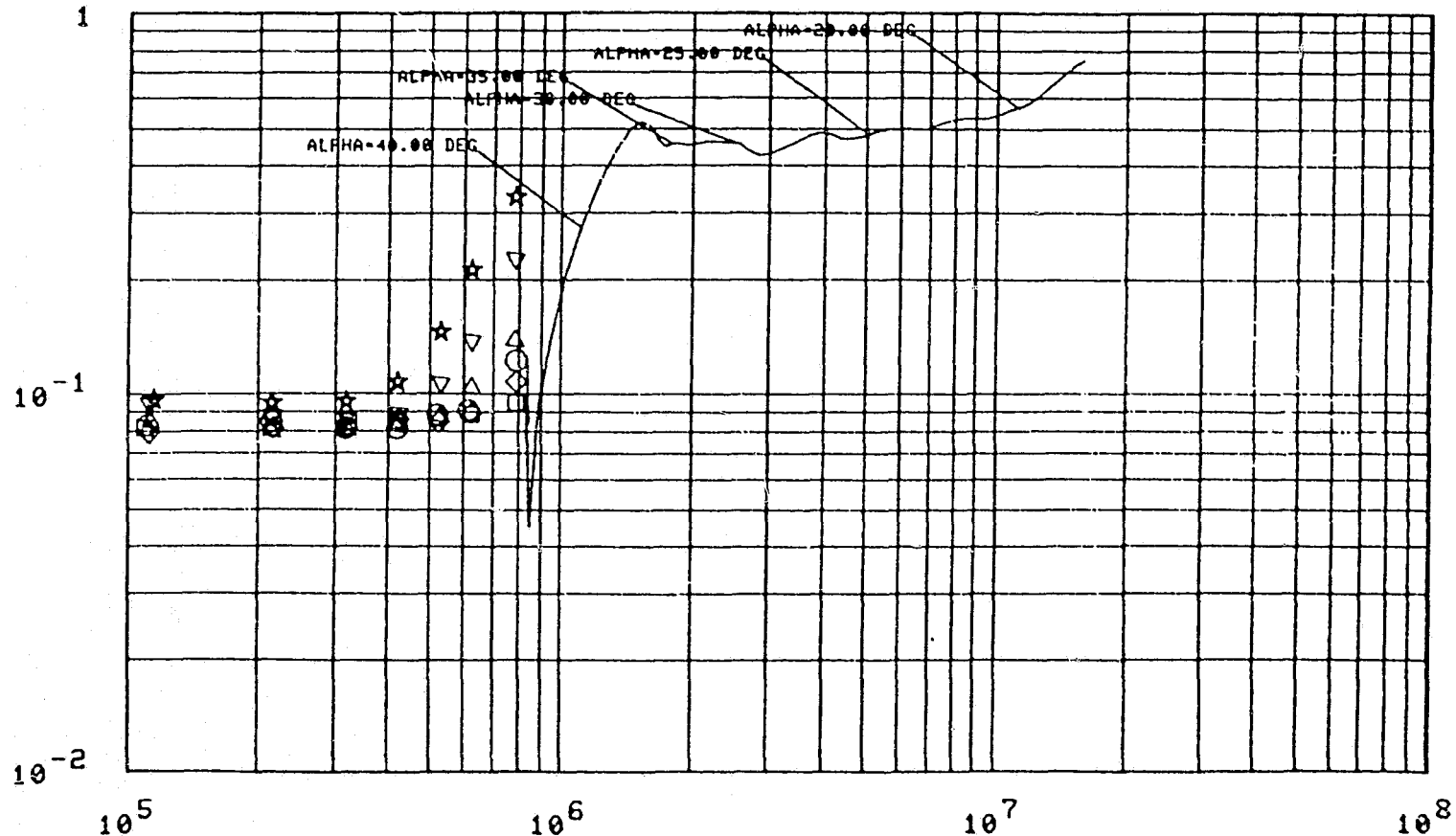
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9671A/H-REF 965-1300 SEC

FILE CODE - H-H-RUL

B-114



ORIGINAL PAGE IS
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REYNOLDS NUMBER (NS)

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BASE TIME = 16040423.000 SEC.

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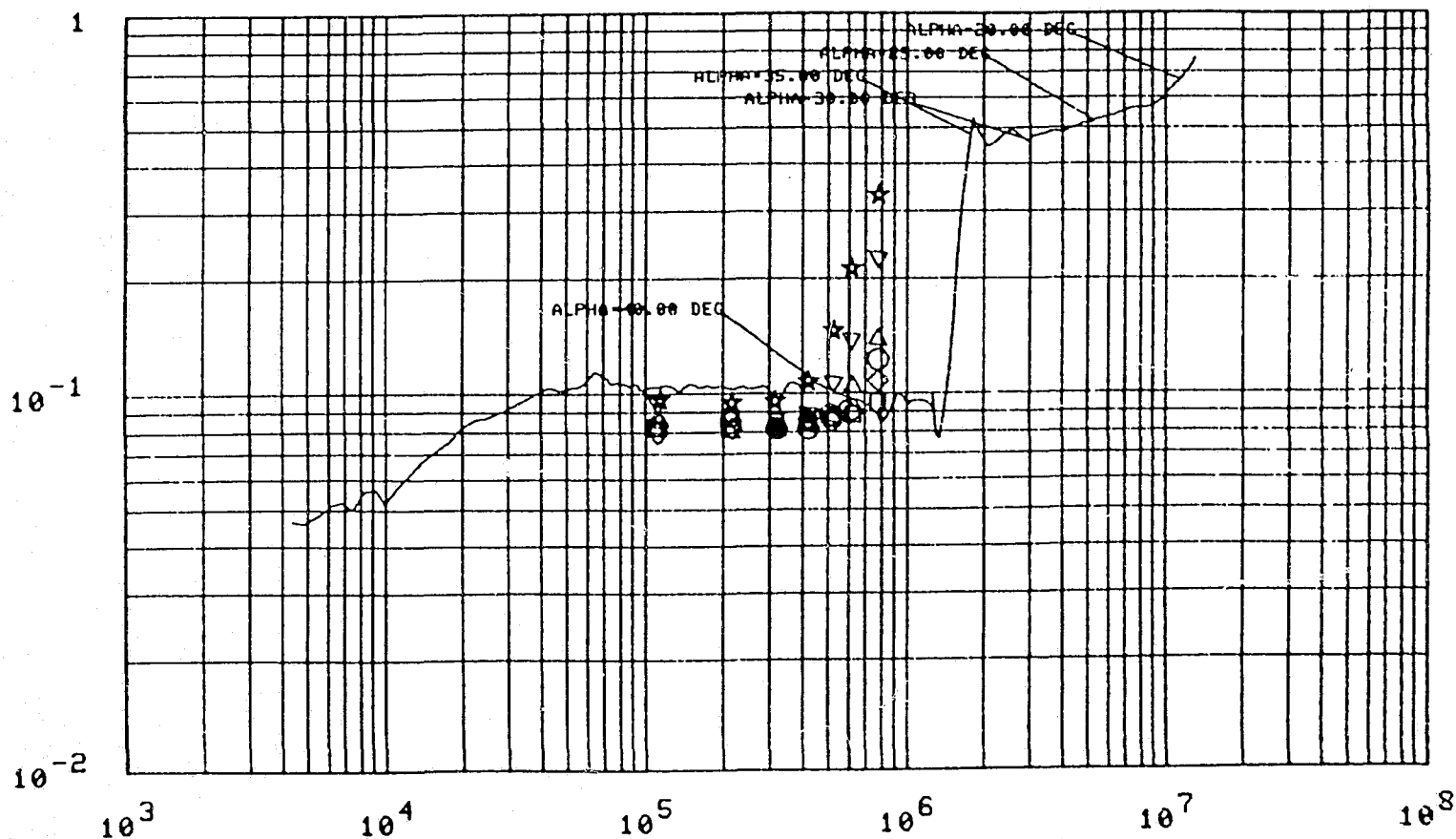
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9671A/H-REF 150-1350 SEC

FILE CODE: H/H-0000

B-115



REYNOLDS NUMBER (NS)

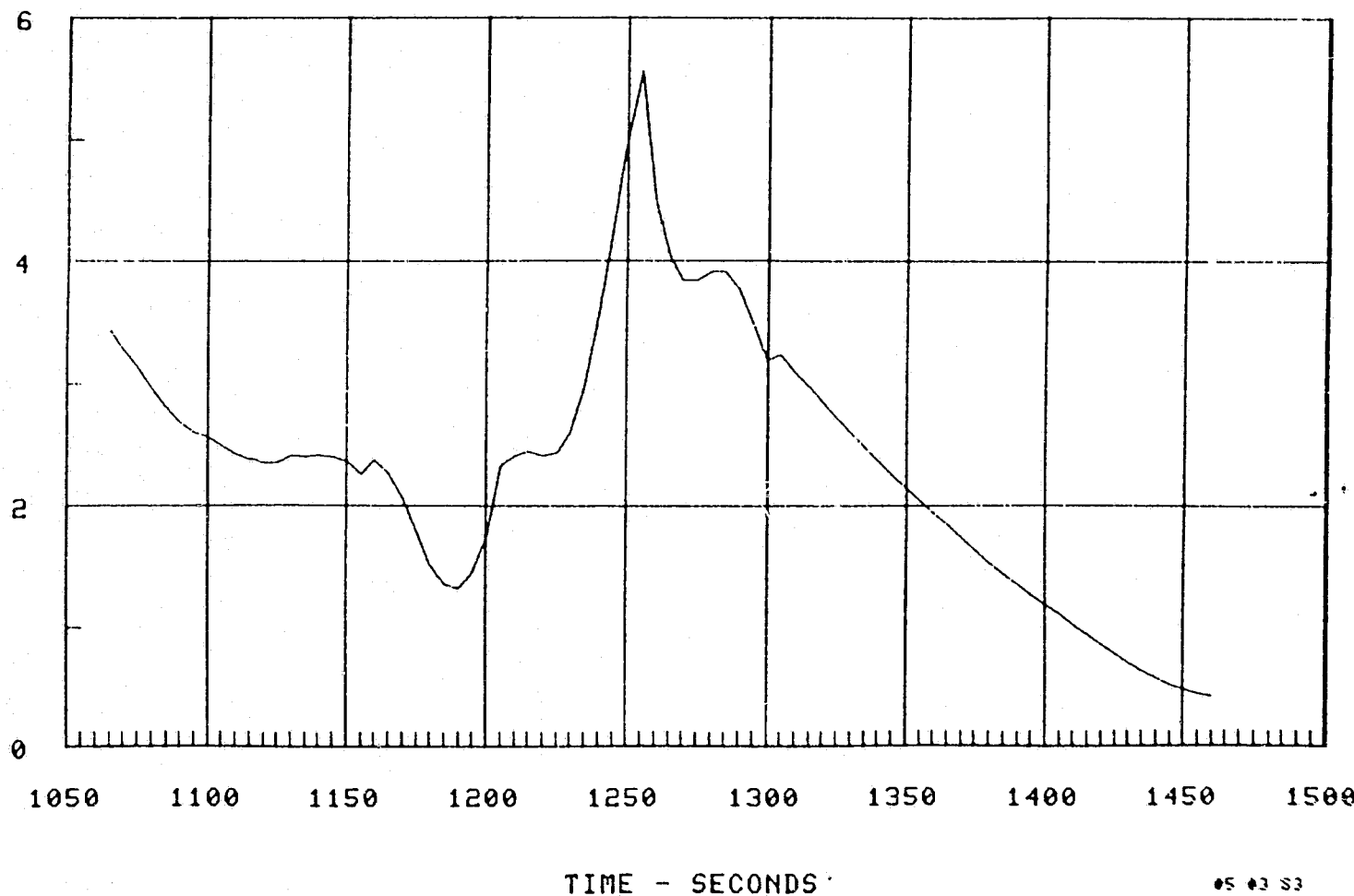
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BASE TIME = 27698591.000 SEC.

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STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

U07T9671A

HEATING RATE - BT-D/FT-HR - SMC



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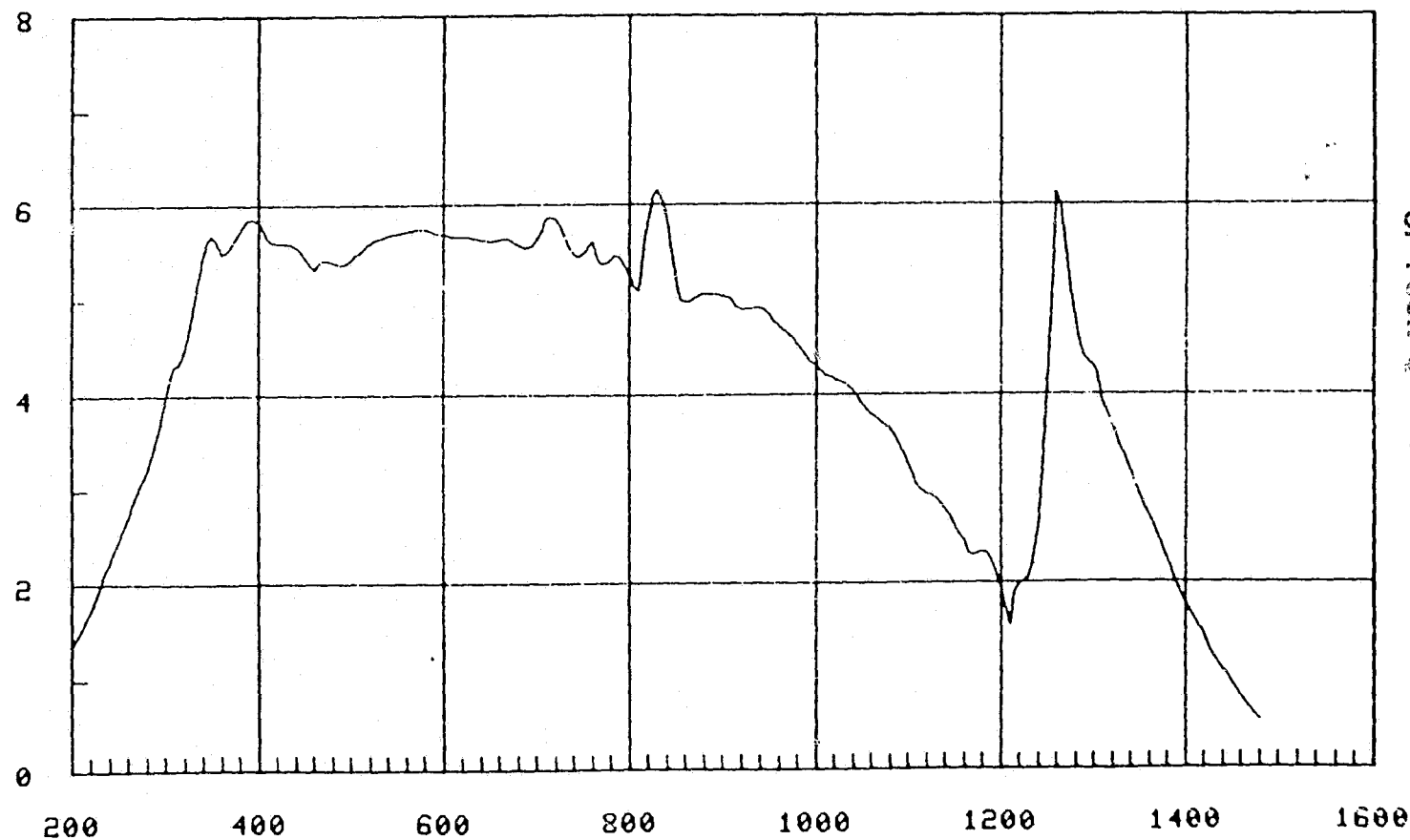
B-116

05 43 S3

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

U07T9671A

HEATING RATE - BULB TEMPERATURE - SEC



TIME - SECONDS

45 43 53

ORIGINAL PAGE IS
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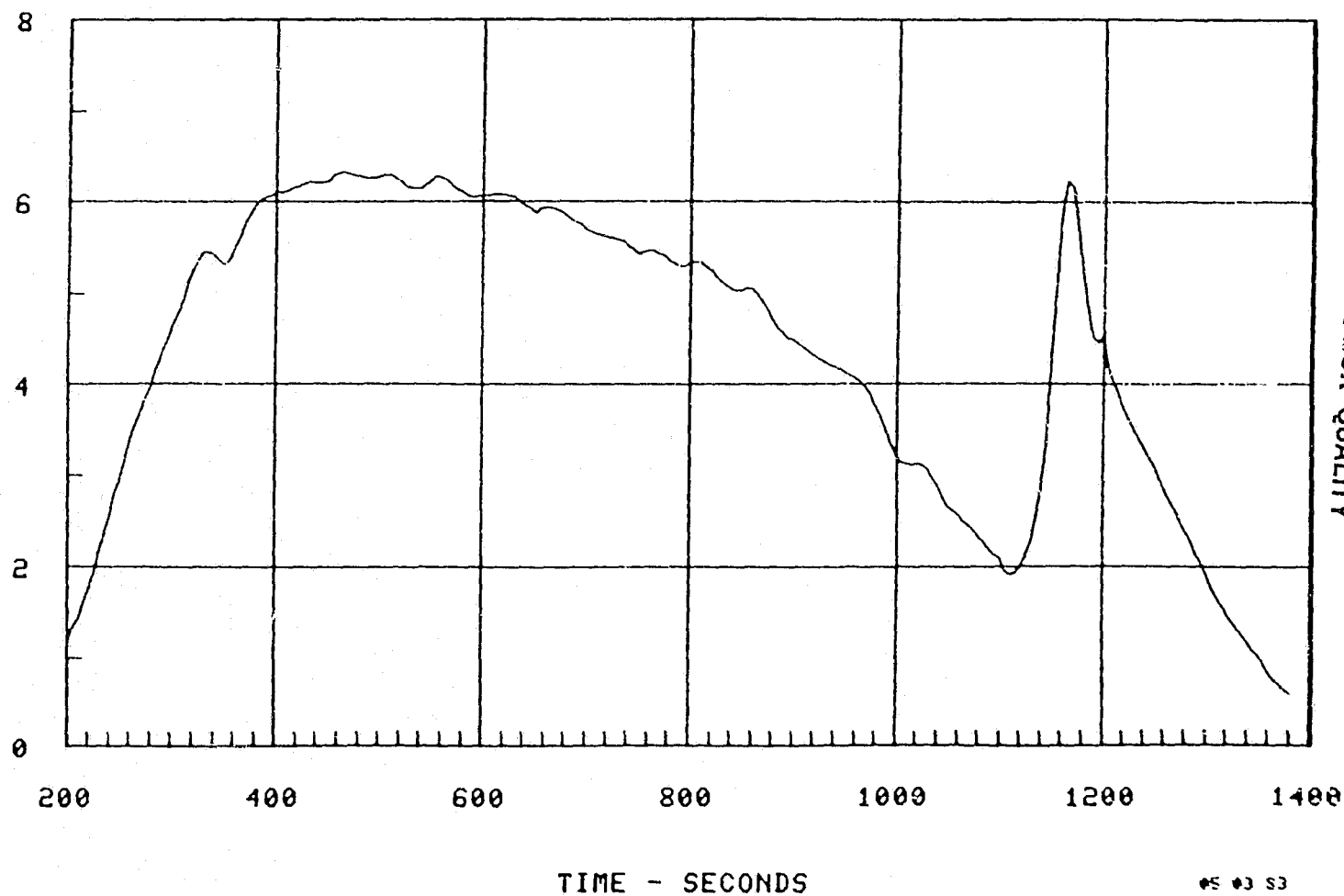
B-117

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U07T9671A

HEATING RATE - BULLETS - SEC

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B-118

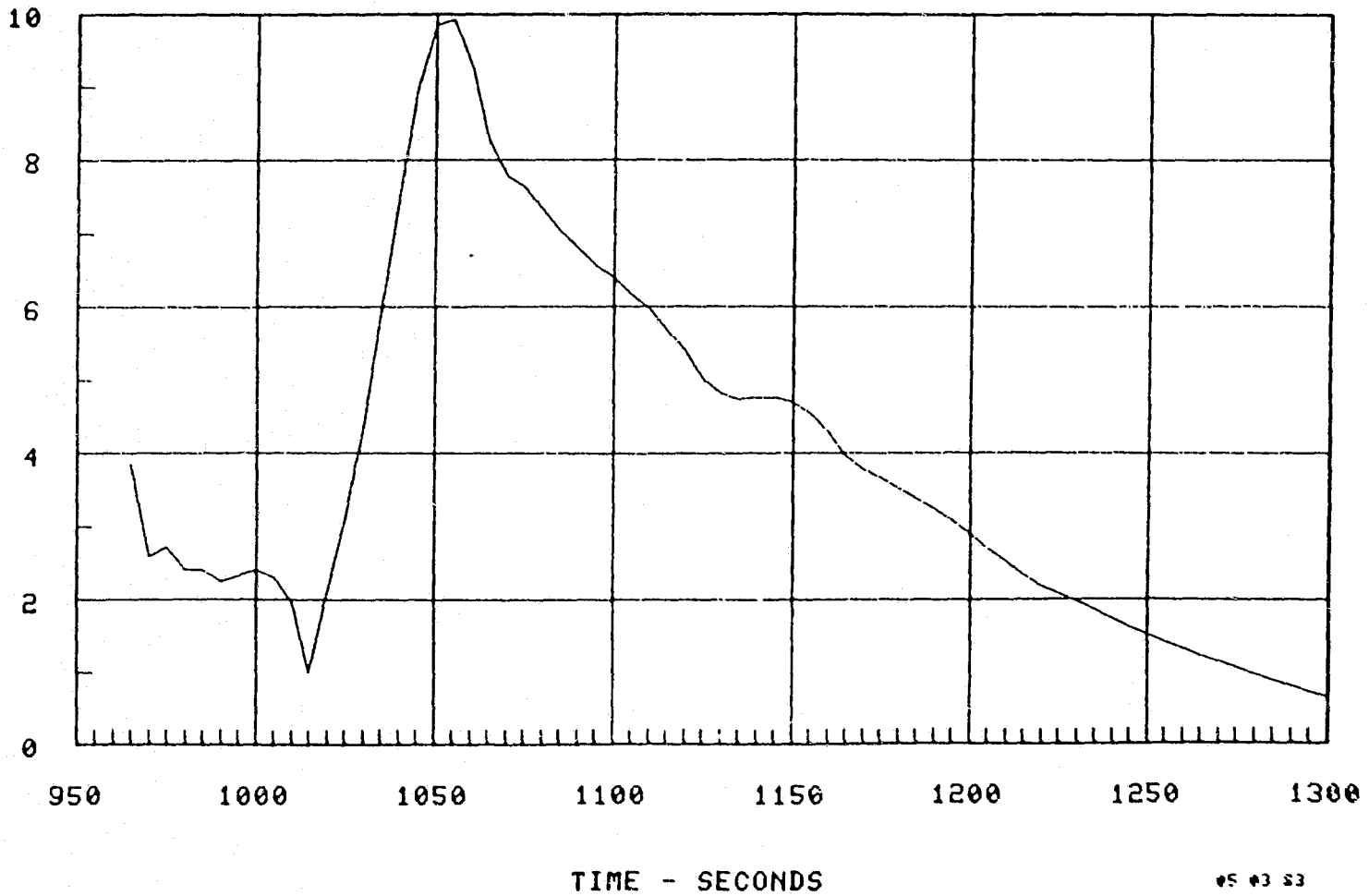
45 43 S3

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U07T9671A

HEATING RATE - BULLETS - SEC

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OF POOR QUALITY



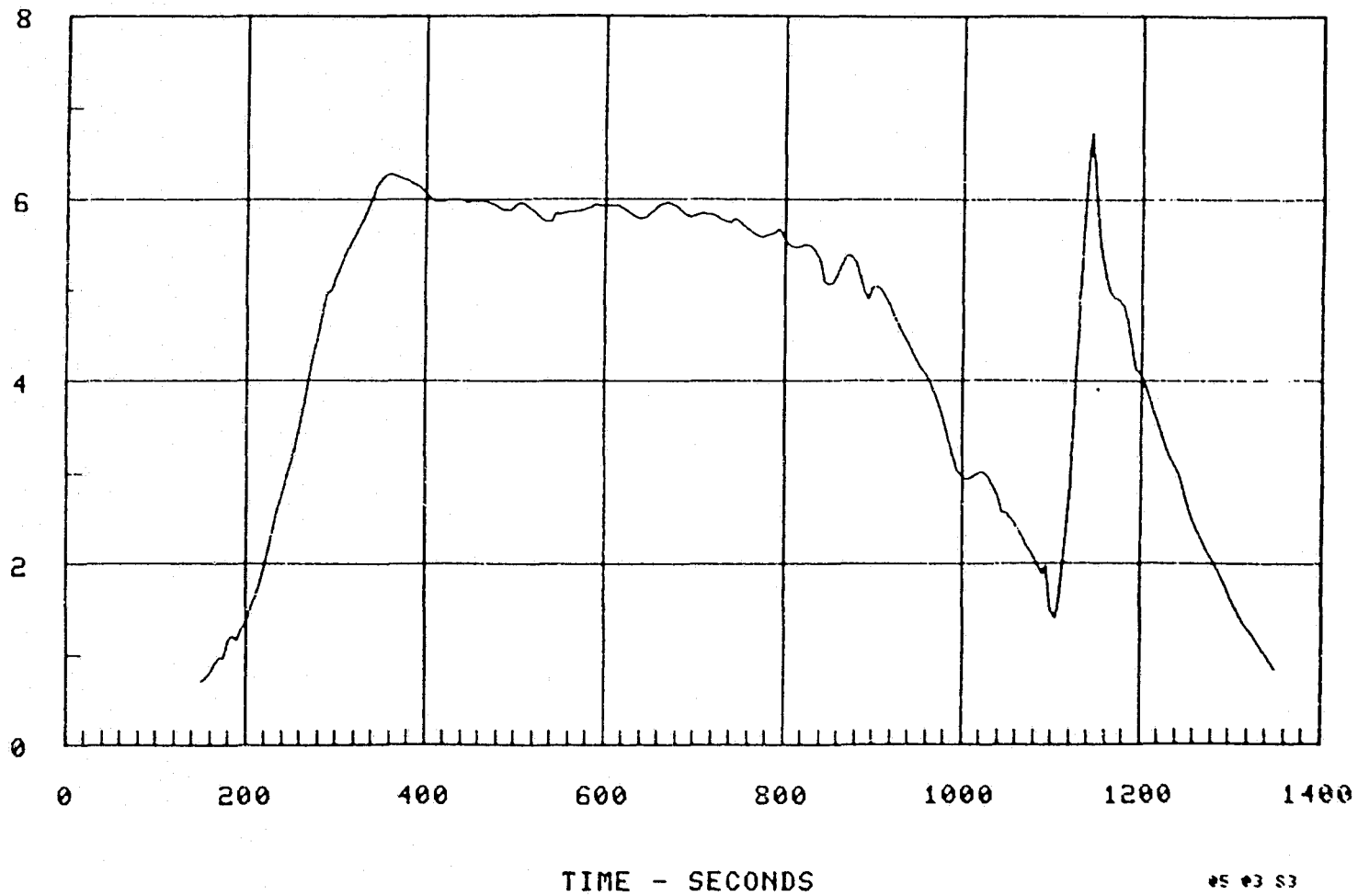
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B-119

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

U07T9671A

HEATING RATE -- BTU/FT**2 -- SEC



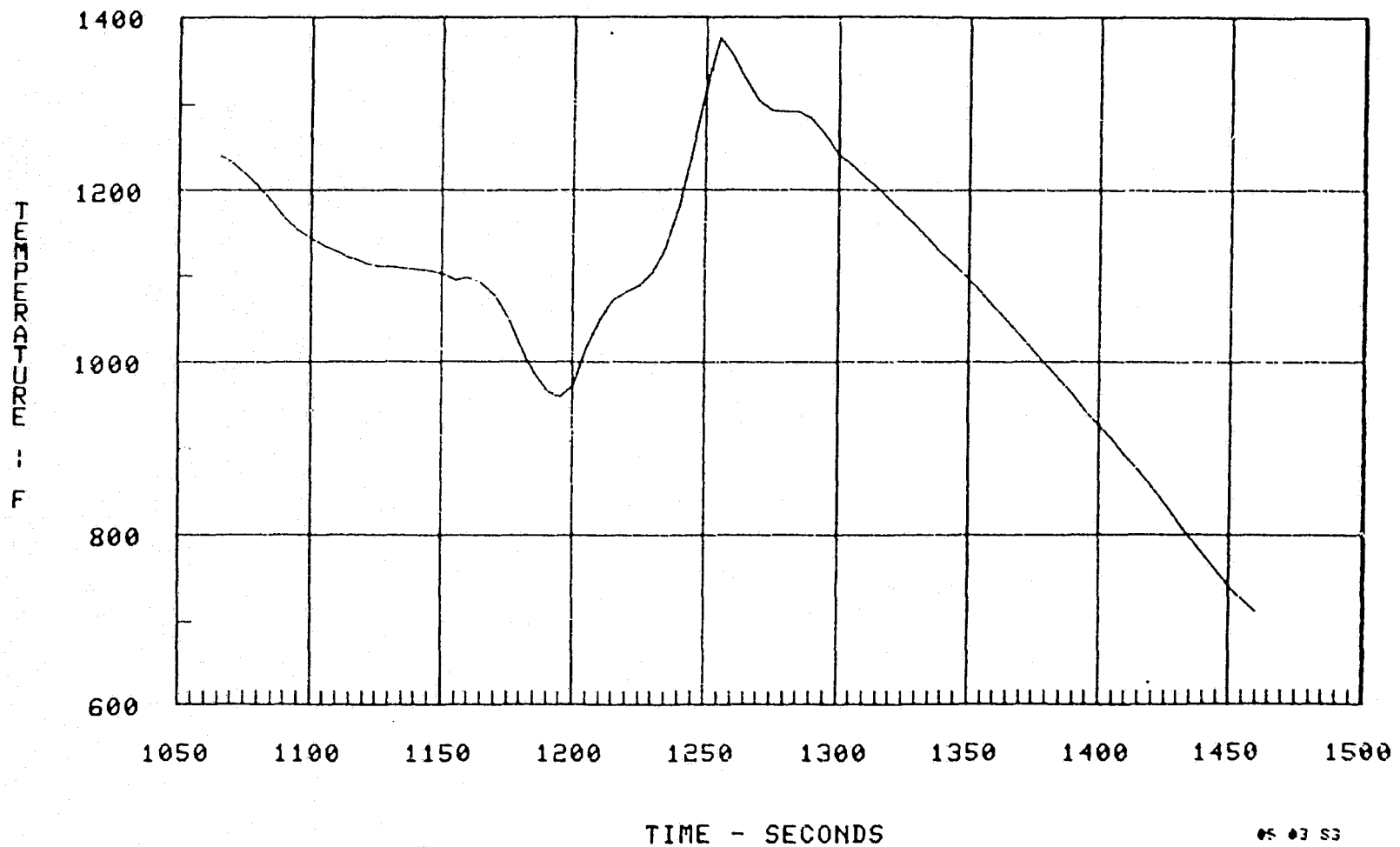
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B-120

05 03 53

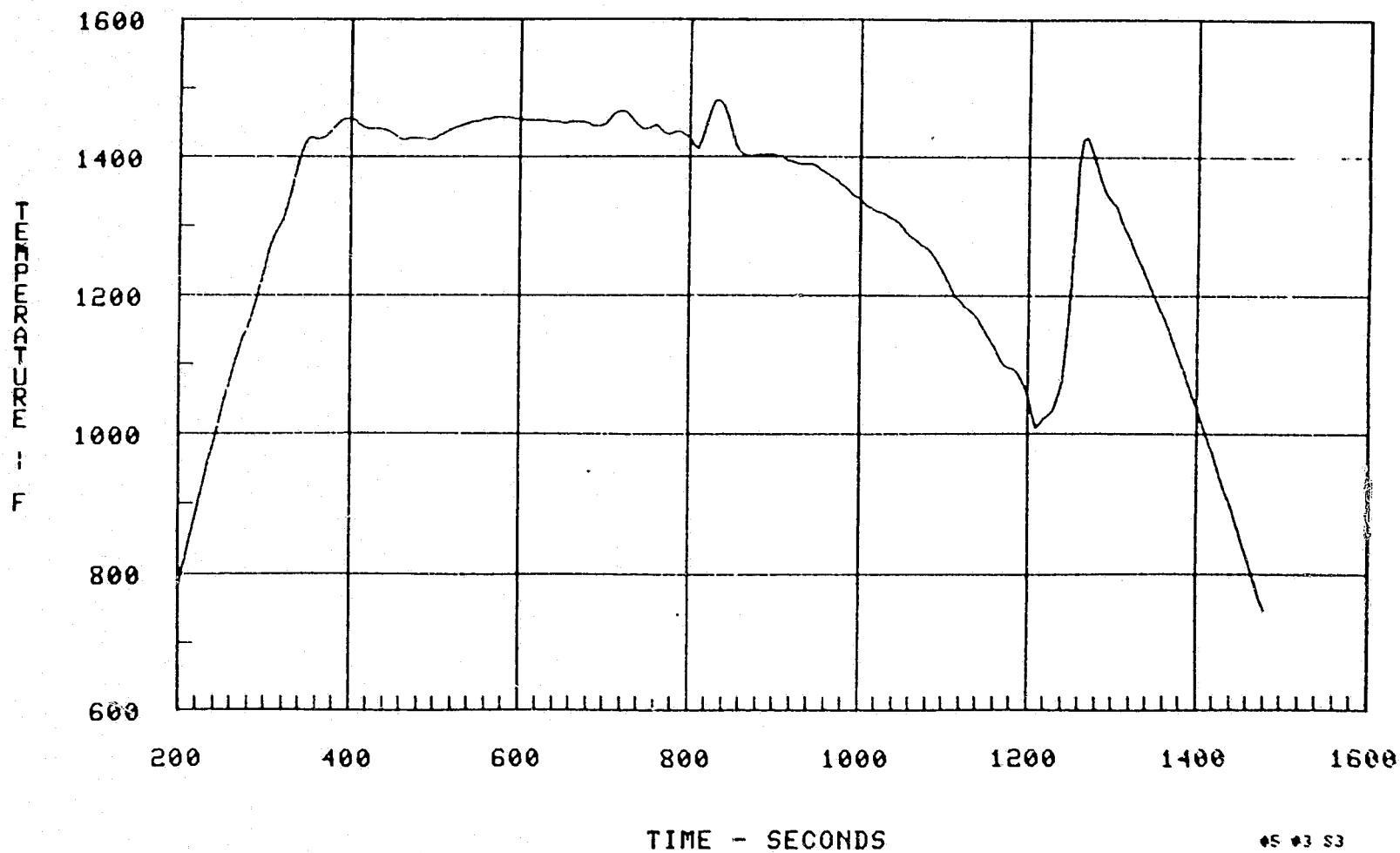
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U07T9671A



STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U87T9671A



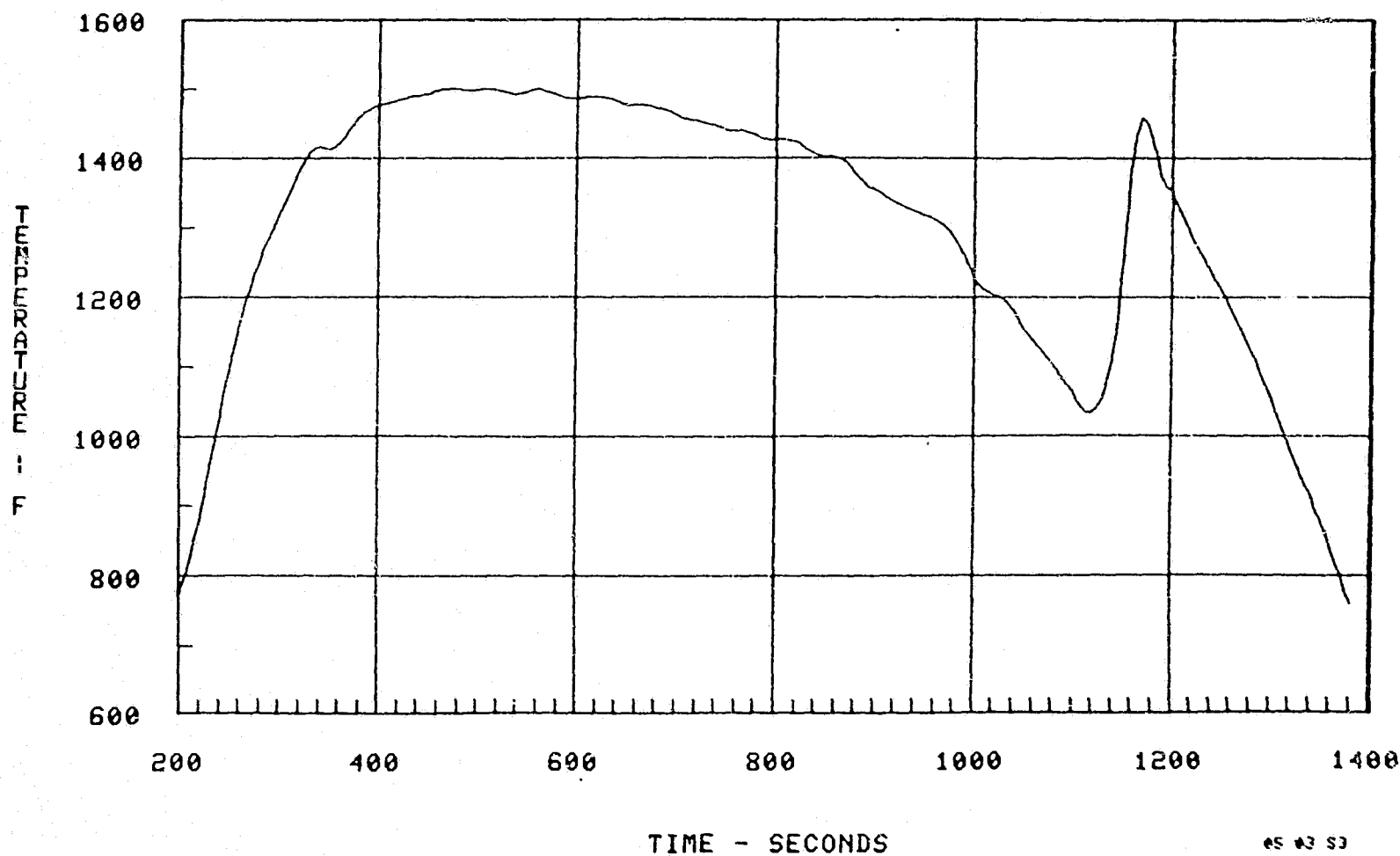
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05 03 S3

B-122

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.50$

U07T9671A

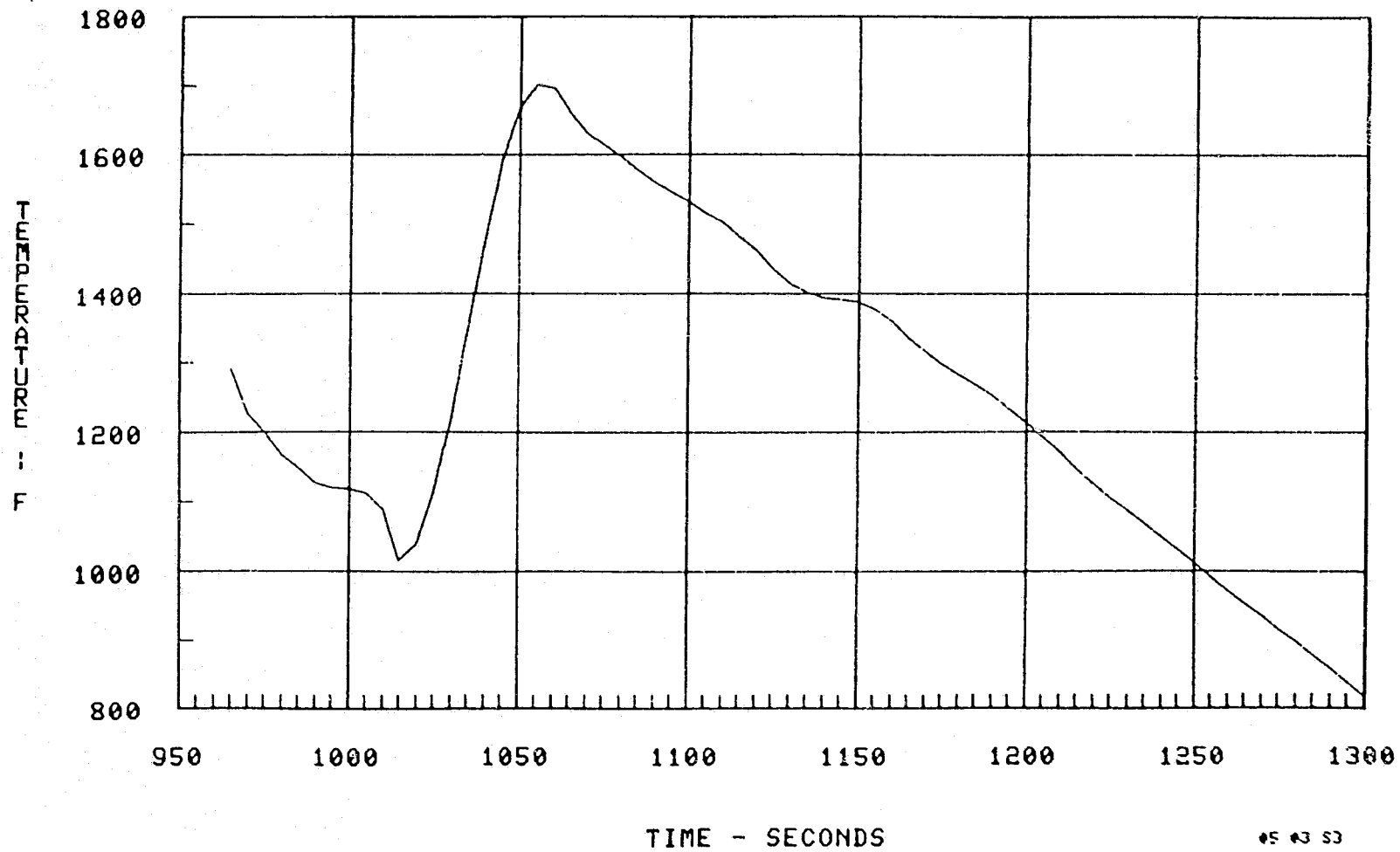


B-123

AS 43 53

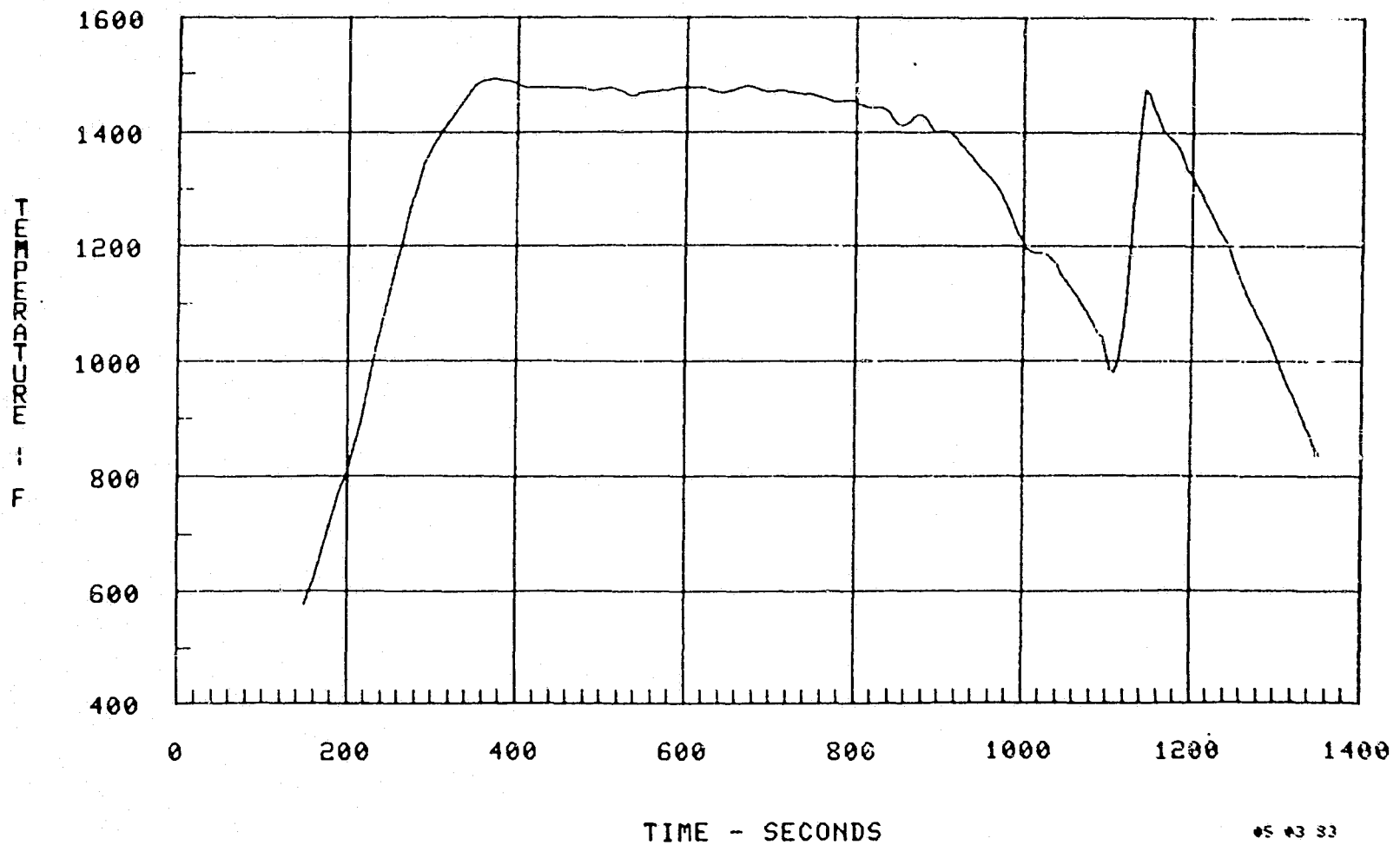
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U07T9671A



STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.50

U07T9671A



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B-125

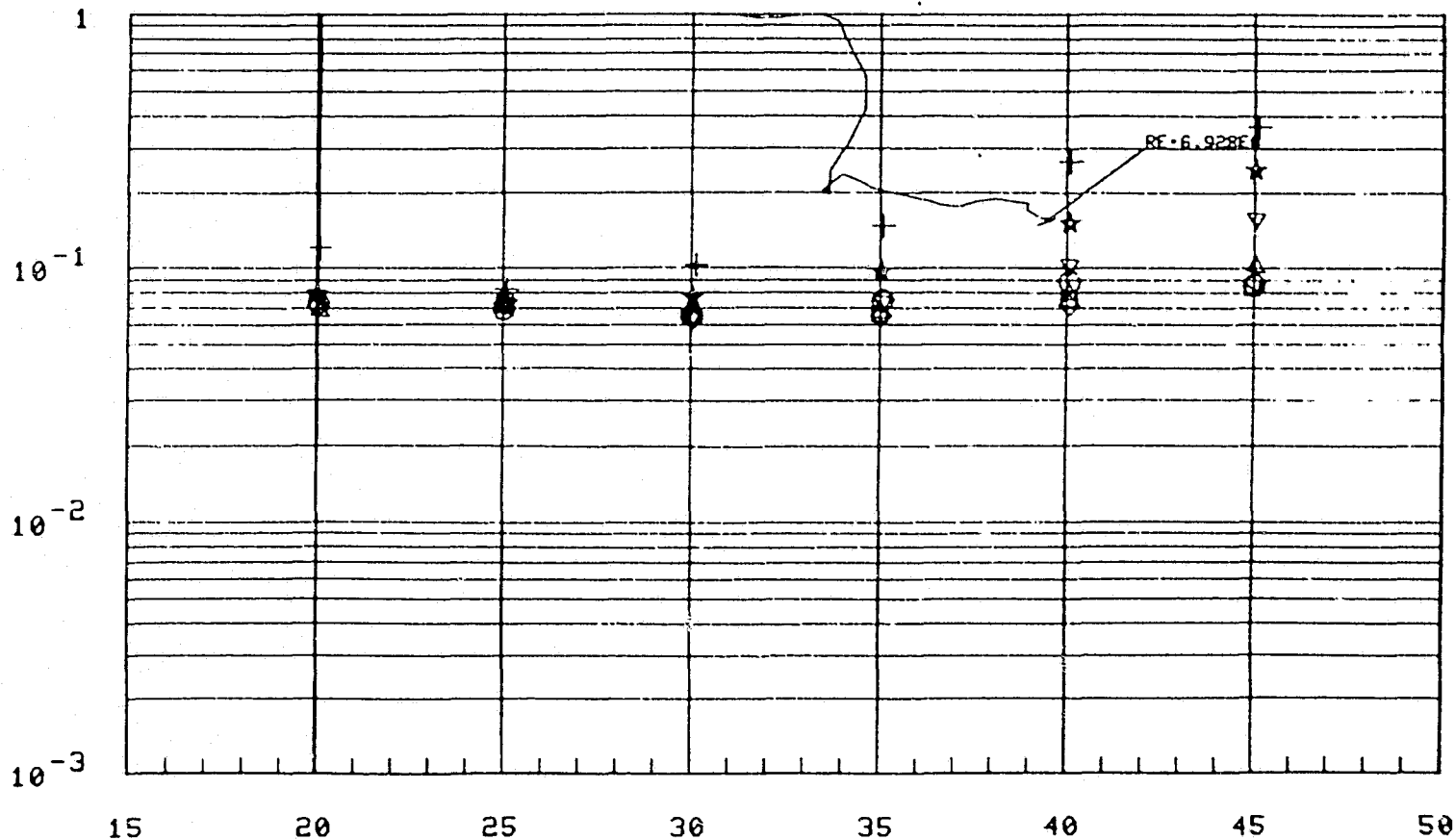
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9673A/H-REF 1065-1460 SEC

FILE CODE - INT-000



ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME * 09049744.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

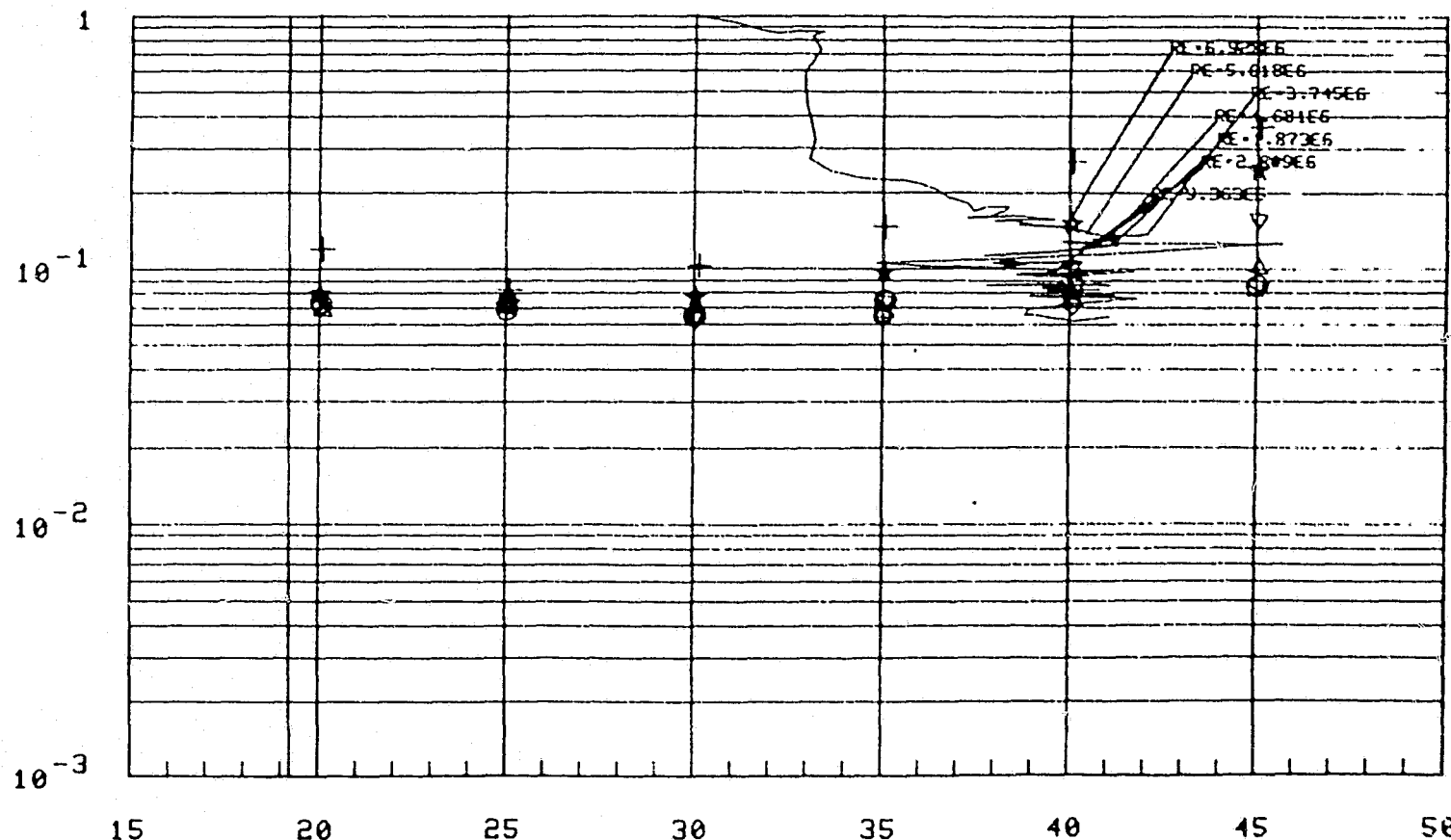
STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9673A/H-REF 200-1480 SEC

FILM COULD NOT BE REPRODUCED



ORIGINAL PAGE IS
OF POOR
QUALITY

ANGLE-OF-ATTACK - DEG

BASE TIME = 27550236.444 SEC.

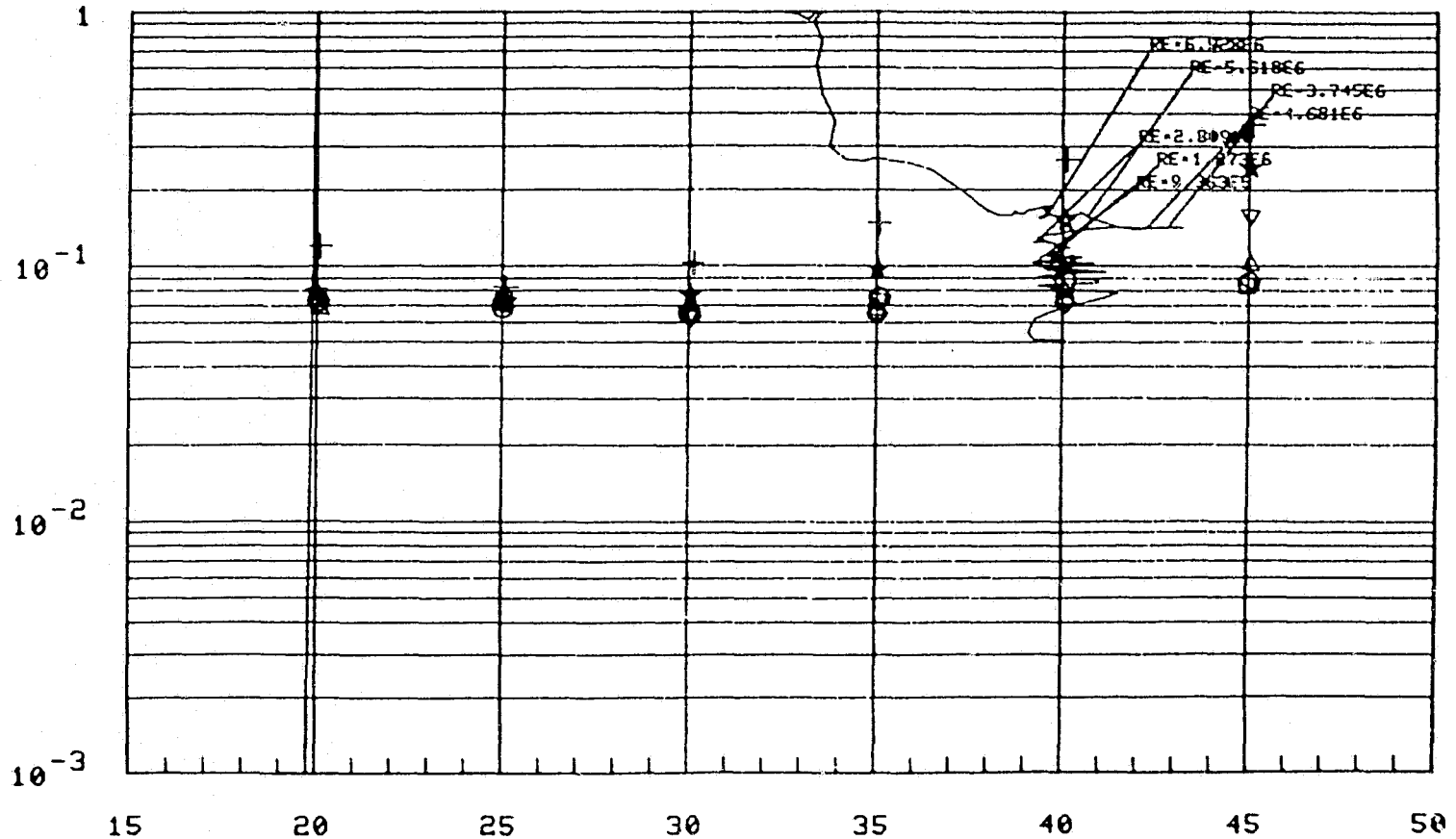
STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9673A/H-REF 200-1380 SEC

LINE COUNT - I/I-QUIL



ANGLE-OF-ATTACK - DEG

BASE TIME = 077456S4.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

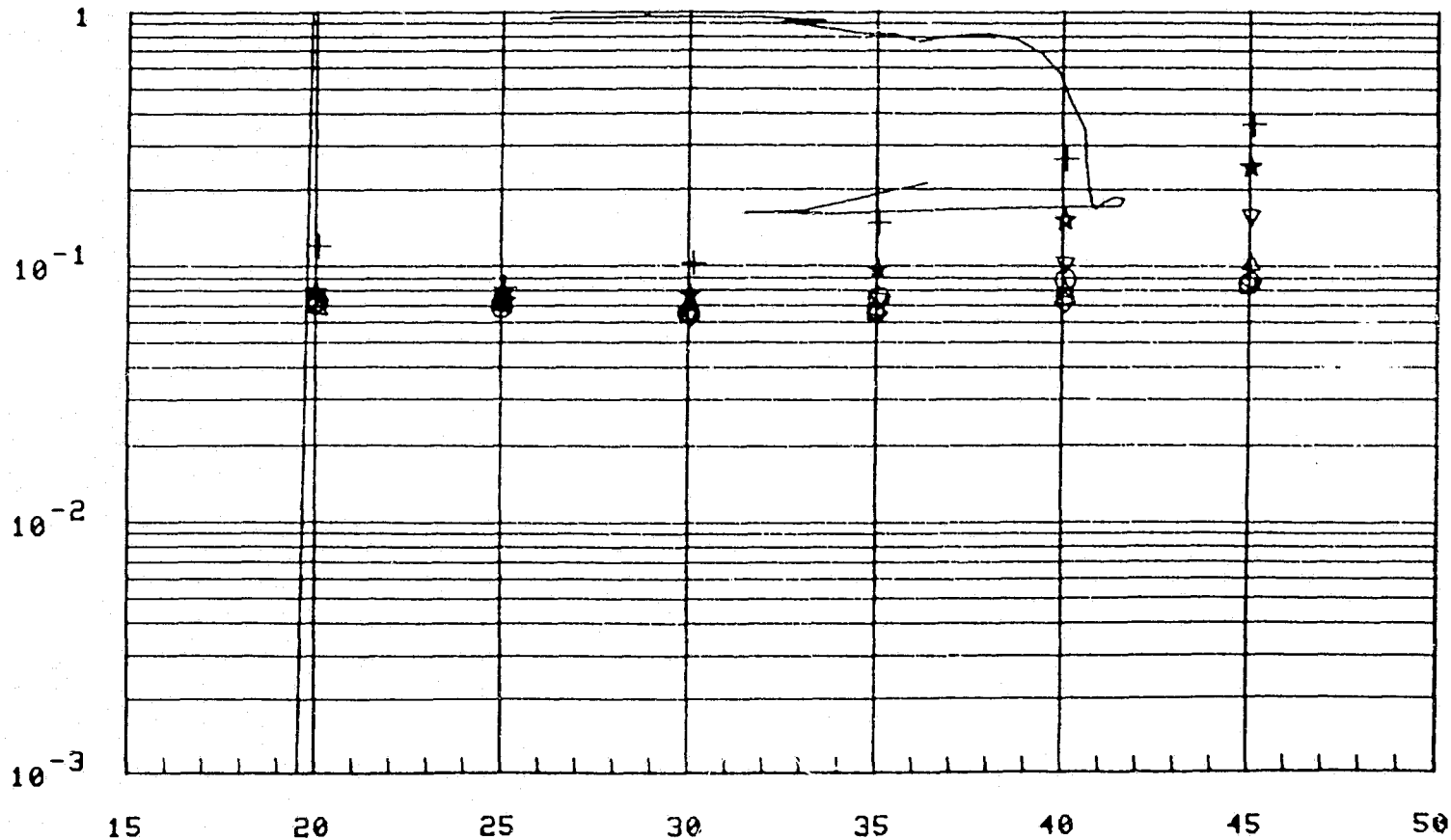
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

U07T9673A/H-REF 965-1300 SEC

LINE CODE - H-H-0000



ANGLE-OF-ATTACK - DEG

BASE TIME • 16040423.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

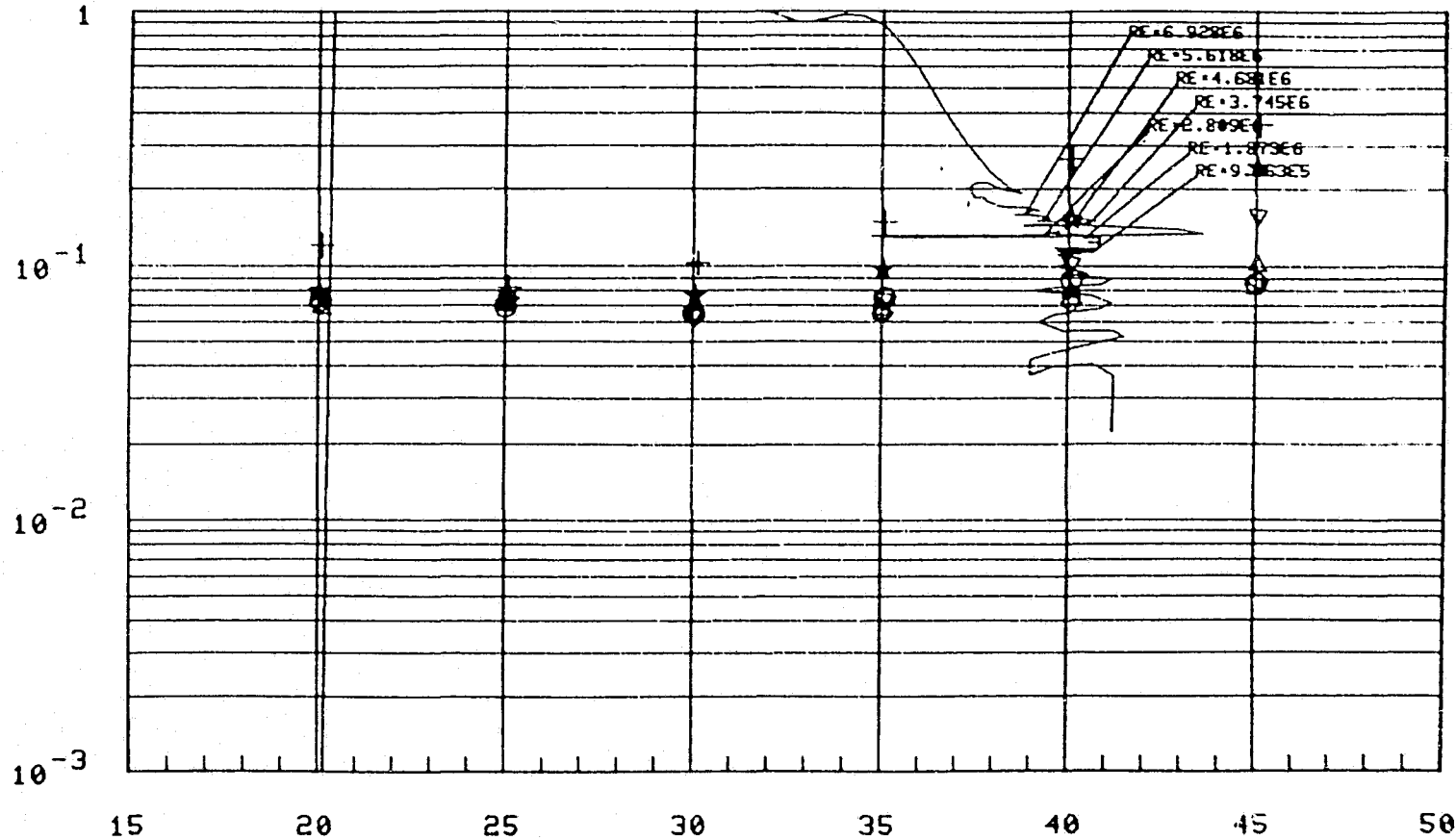
STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9673A/H-PEF 150-1350 SEC

LINE COUNT - INTERVAL



ANGLE-OF-ATTACK - DEG

#5 #3 S3
BASE TIME = 27695591.000 SEC

ORIGINAL PAGE IS
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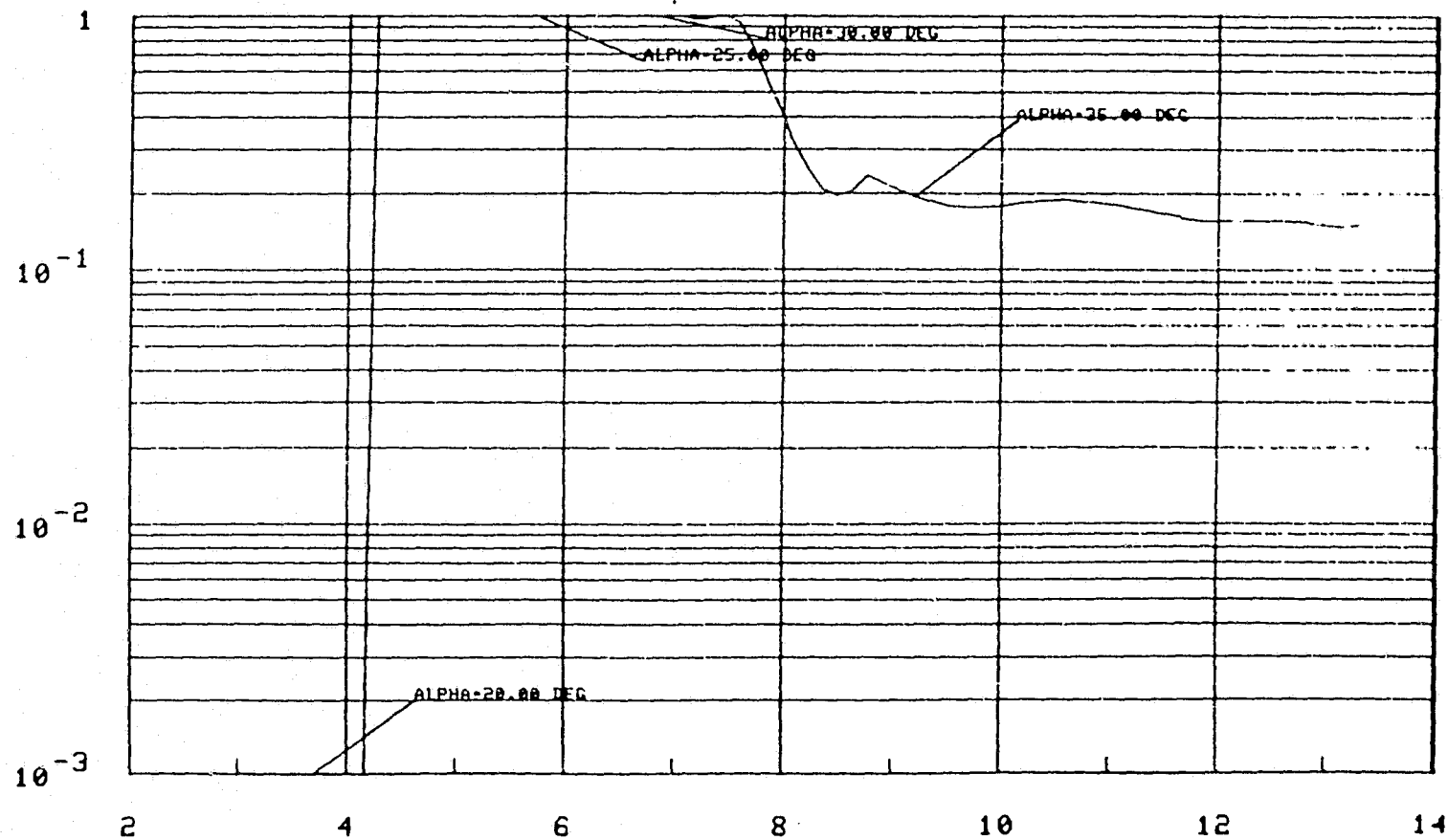
B-130

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A/H-REF 1065-1460 SEC

TIME CORRECTED H/H-REF

B-131



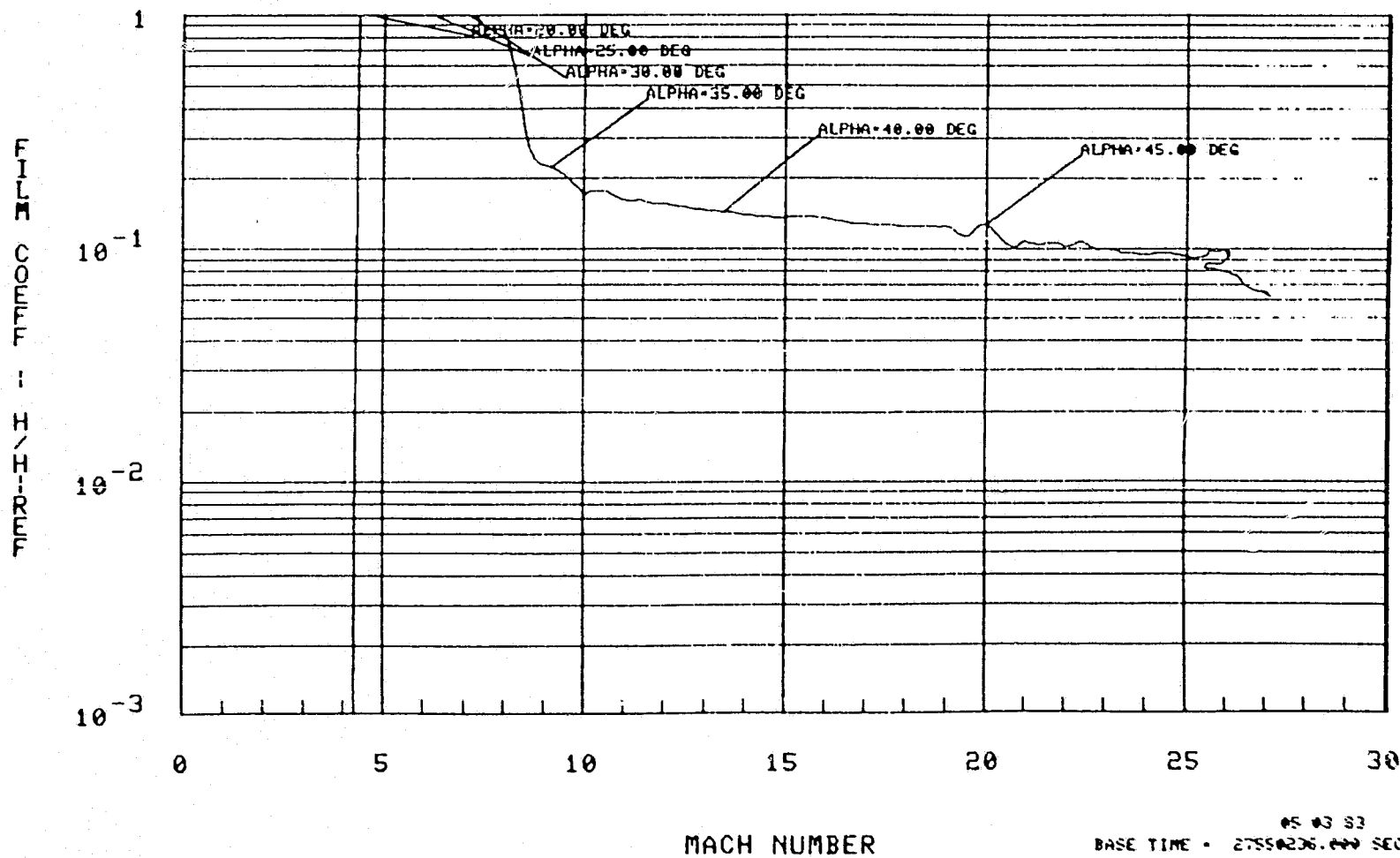
ORIGINAL PAGE IS
OF POOR QUALITY

MACH NUMBER

05-03 S3
BASE TIME = 09049744.000 SEC.

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.61

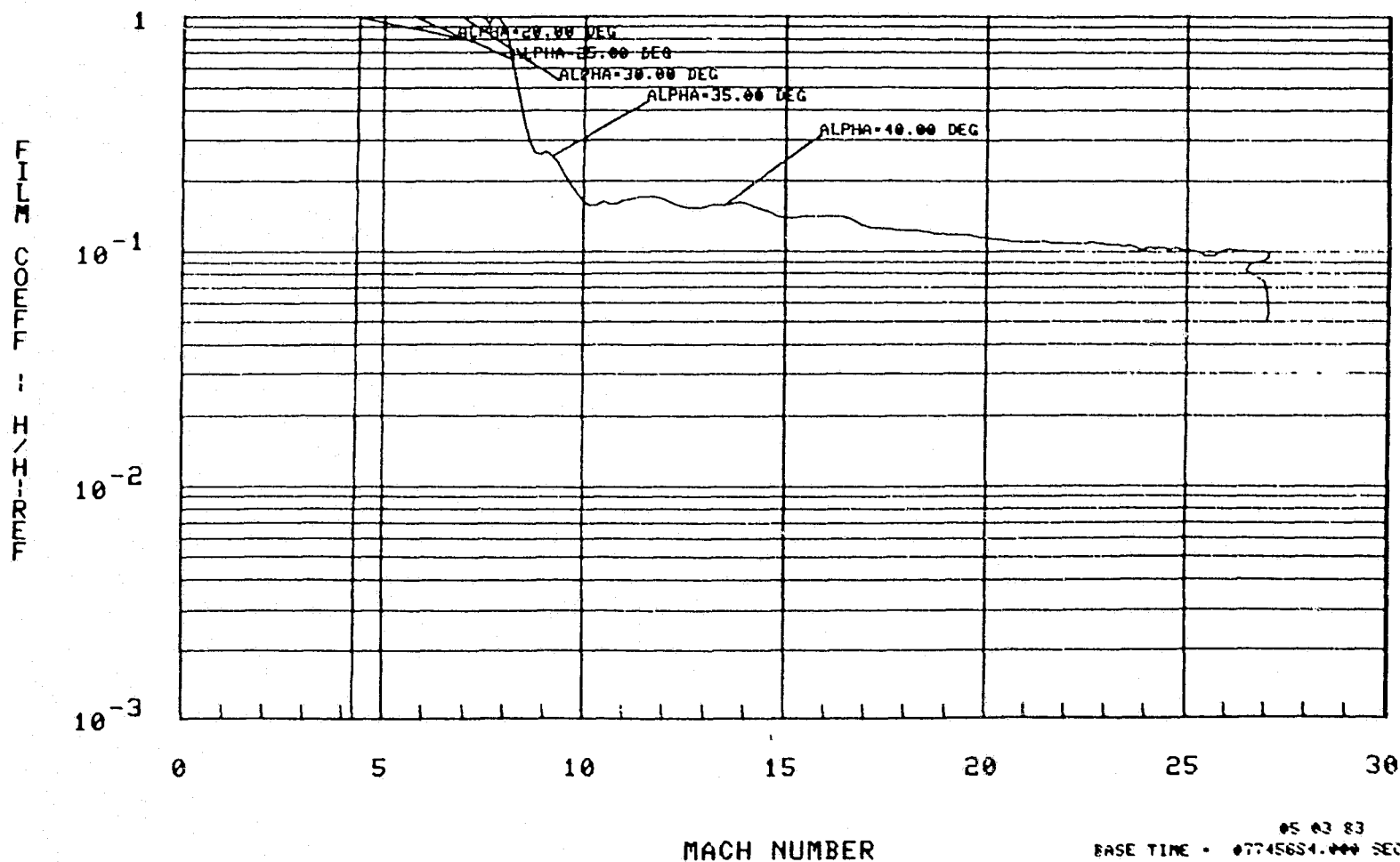
U07T9673A/H-REF 200-1480 SEC



ORIGINAL PAGE IS
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STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A/H-REF 200-1380 SEC

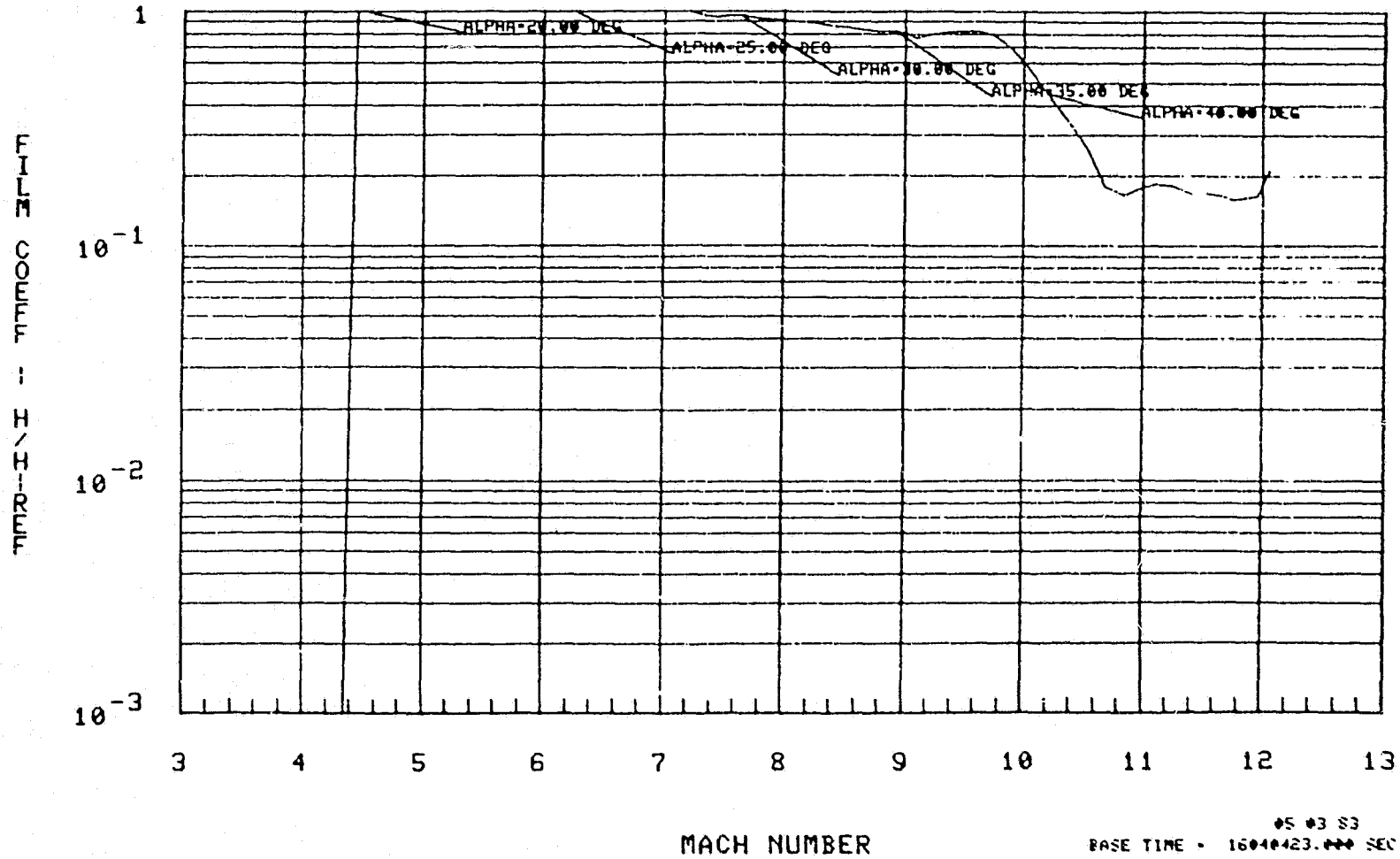


B-133

ORIGINAL DATA
OF POOR QUALITY

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A/H-REF 965-1300 SEC



ORIGINAL PAGE IS
OF POOR QUALITY

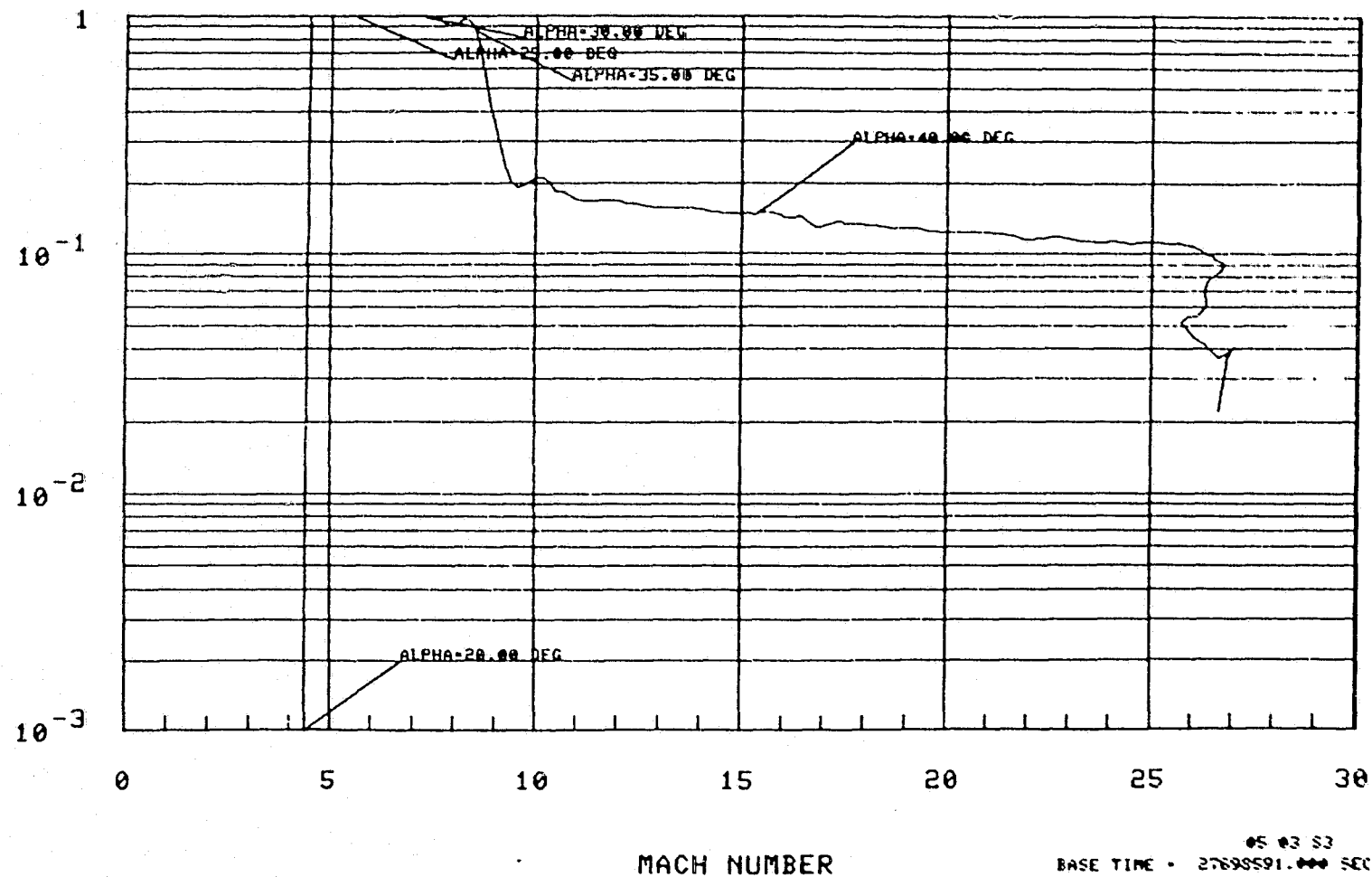
B-134

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

U07T9673A/H-REF 150-1350 SEC

FILE CODEL - H/H-REF

B-135



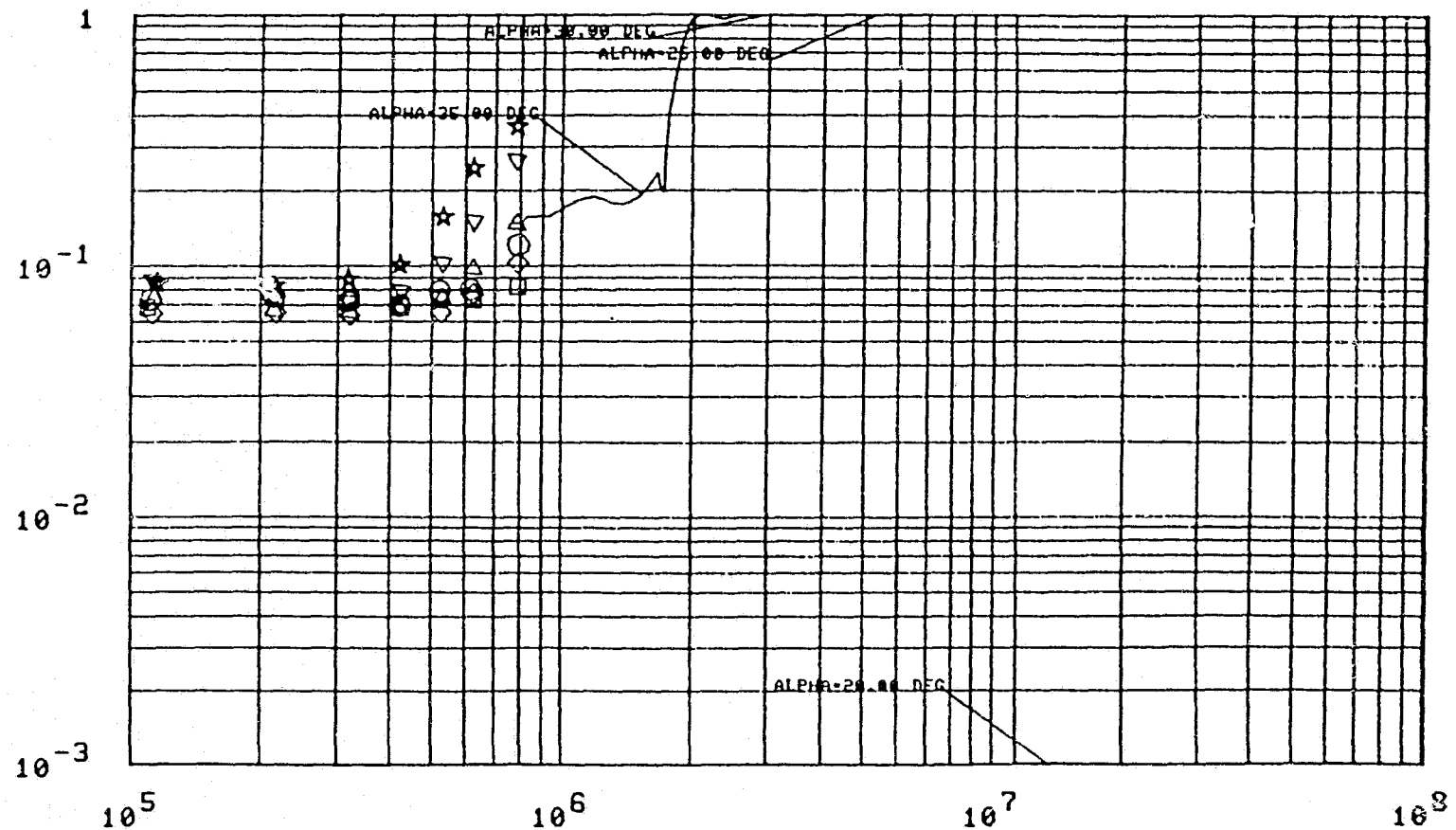
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9673A/H-REF 1065-1460 SEC

FILE CODE - H/H-REF



ORIGINAL PAGE IS
OF POOR QUALITY

REYNOLDS NUMBER (NS)

05 03 83
BASE TIME • 09049744.000 SEC.

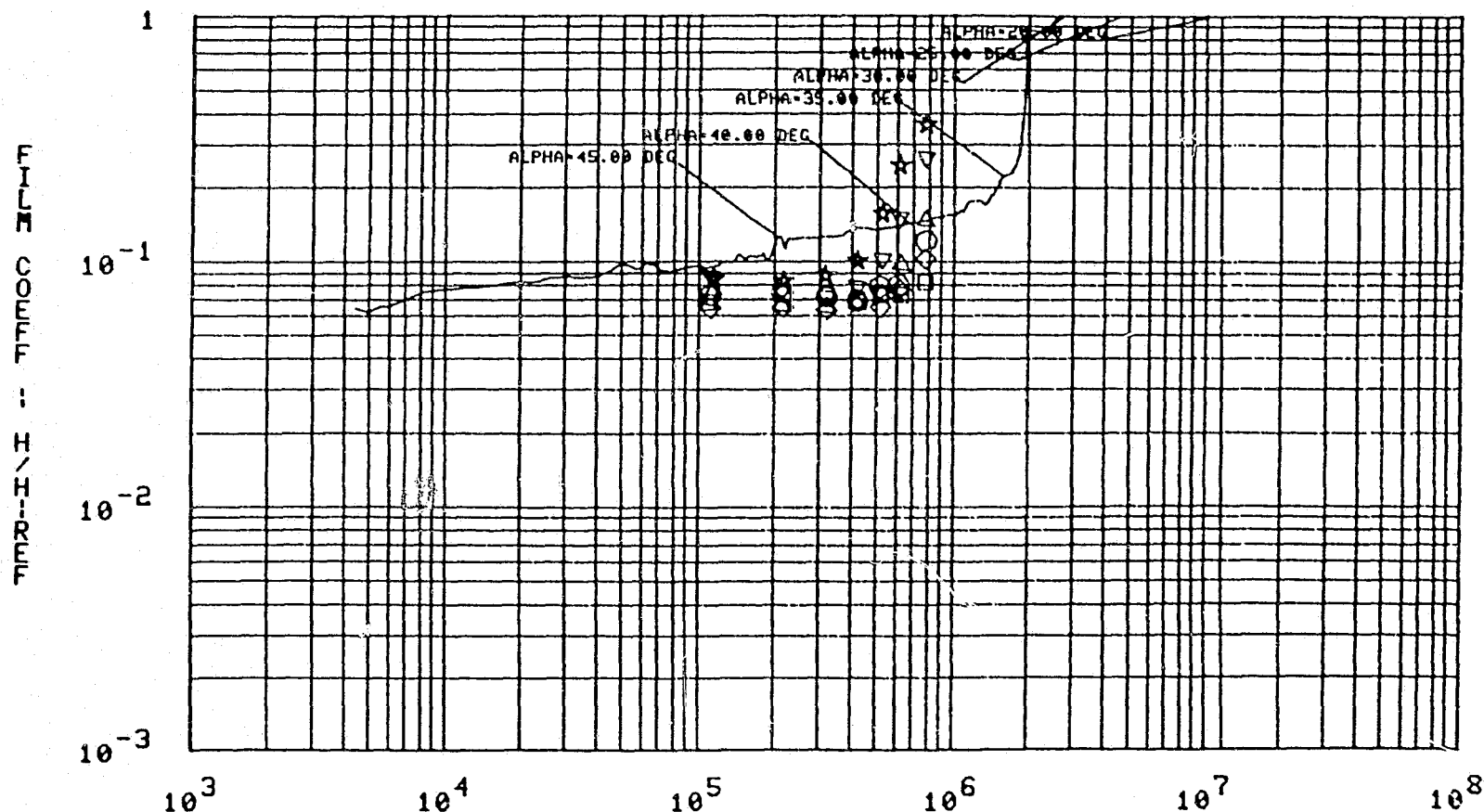
B-136

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9673A/H-REF 200-1480 SEC



REYNOLDS NUMBER (NS)

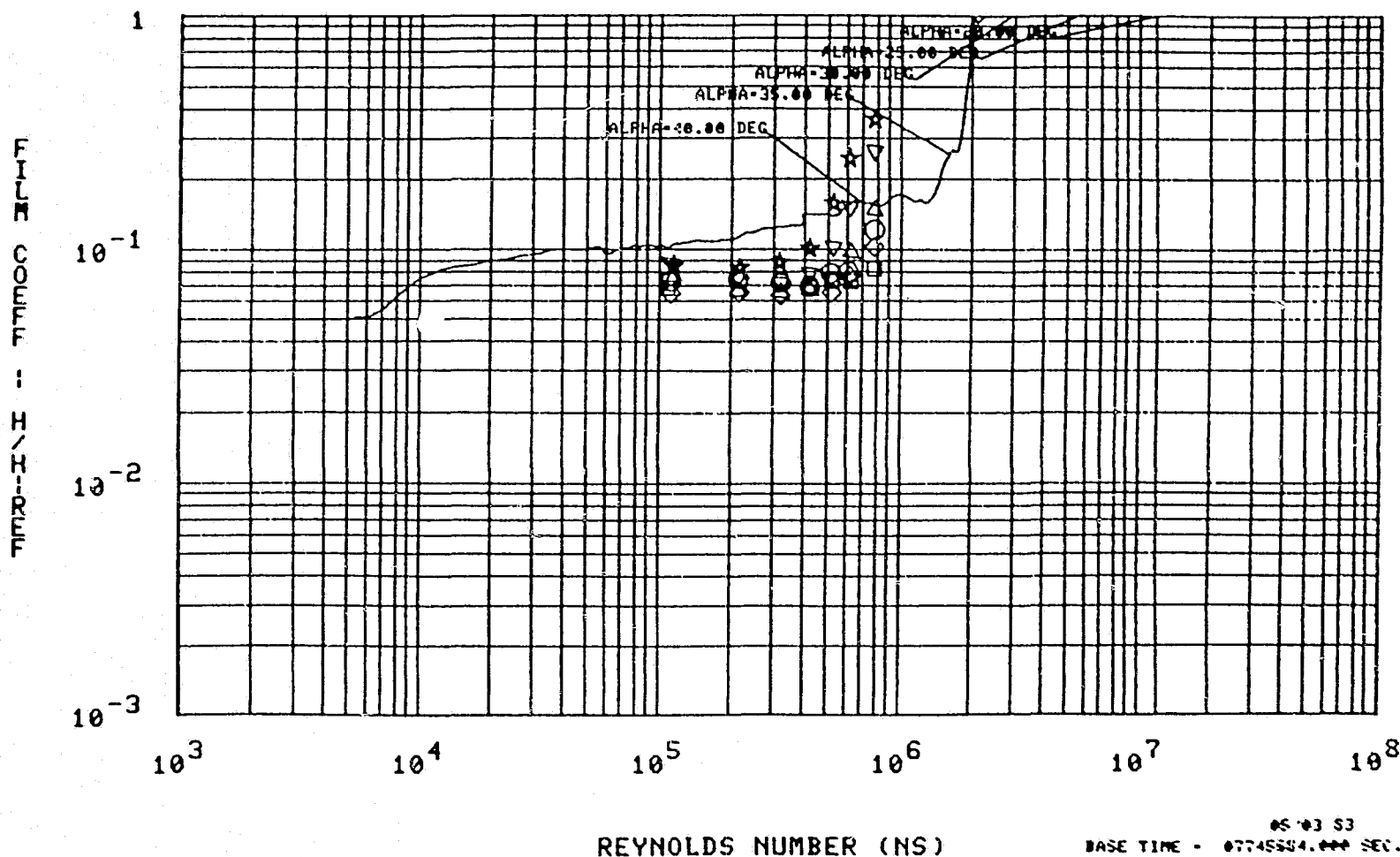
05-03 S2
BASE TIME = 27550236.000 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9673A/H-REF 200-1380 SEC



B-138

ORIGINAL PAGE IS
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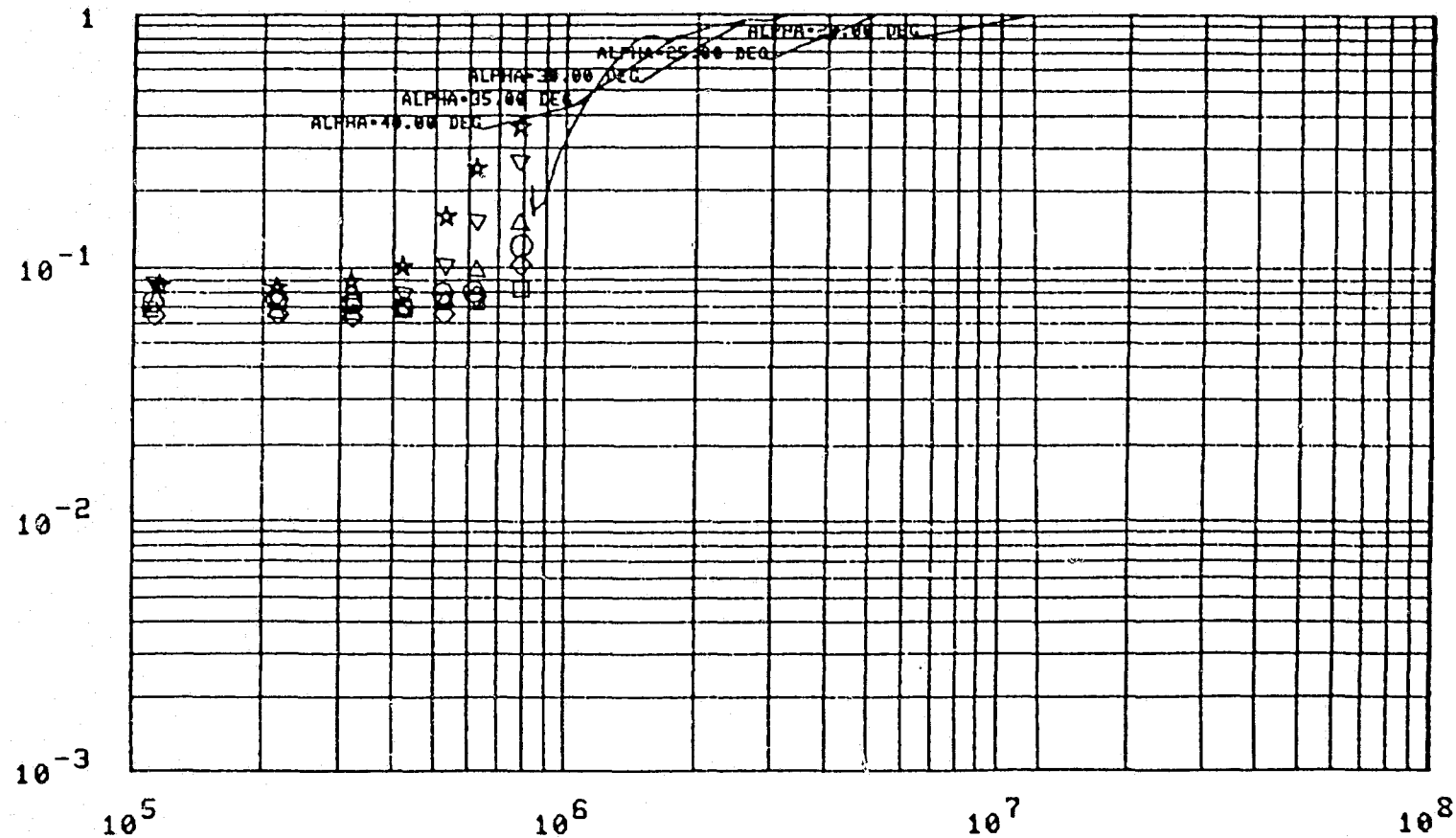
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9673A/H-REF 965-1300 SEC

WING COEFF. - I/I-REF



ORIGINAL FILE IS
OF POOR QUALITY

B-139

REYNOLDS NUMBER (NS)

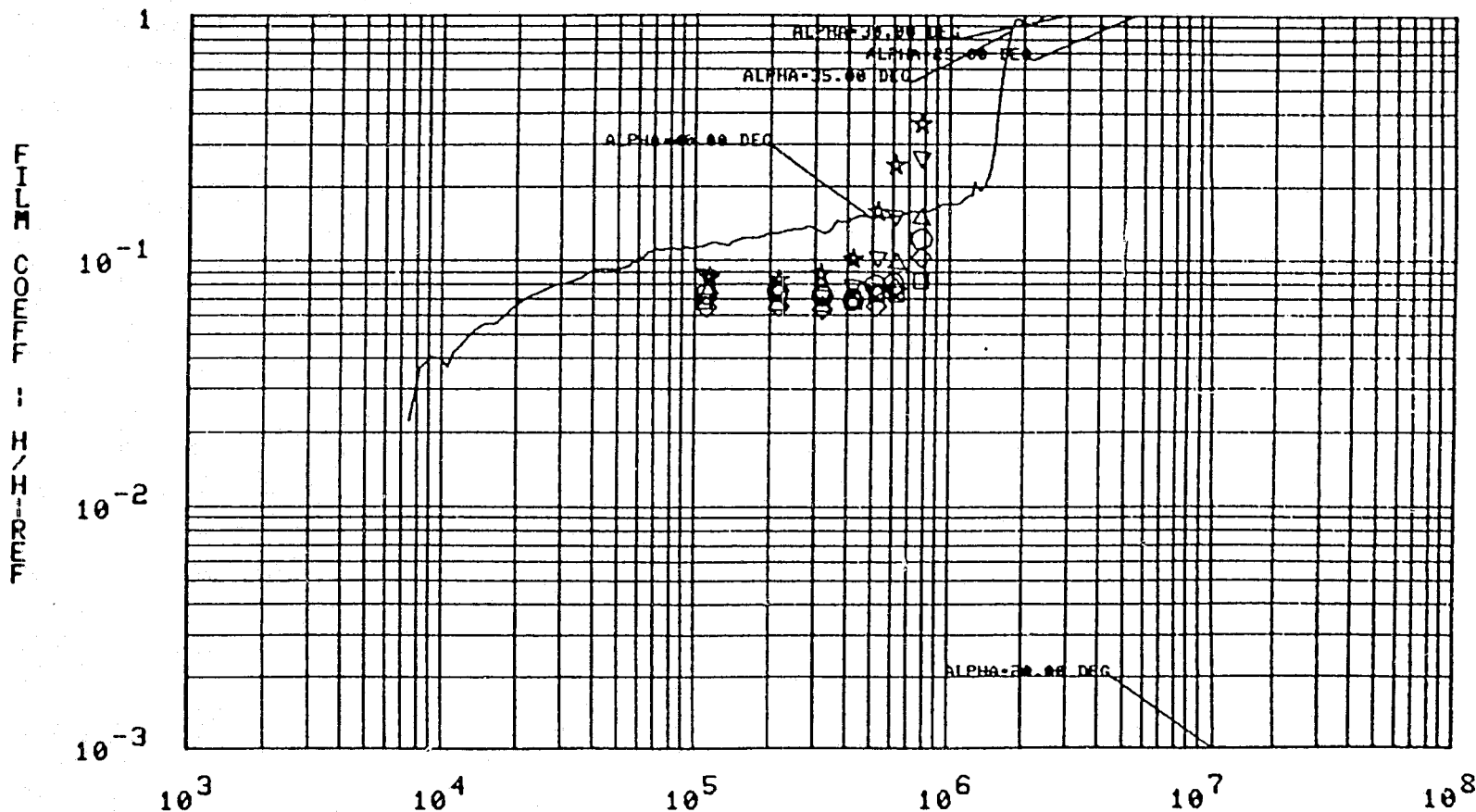
05-03 S3
BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.61

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9673A/H-REF 150-1350 SEC



B-140

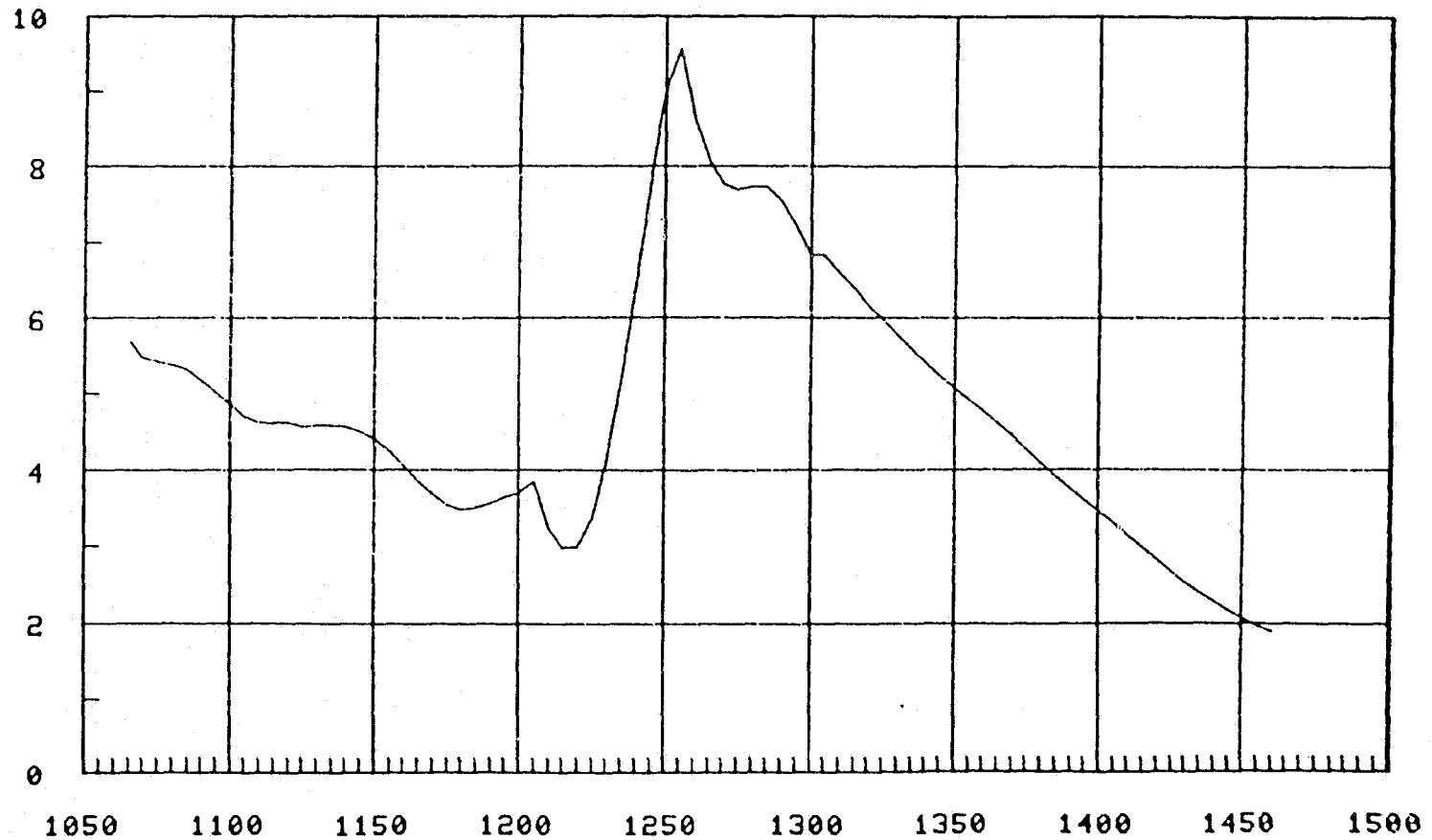
REYNOLDS NUMBER (NS)

OS #3 S3
BASE TIME = 27698591.444 SEC.

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A

HEATING RATE - BULB/FT**2 - SEC



TIME - SECONDS

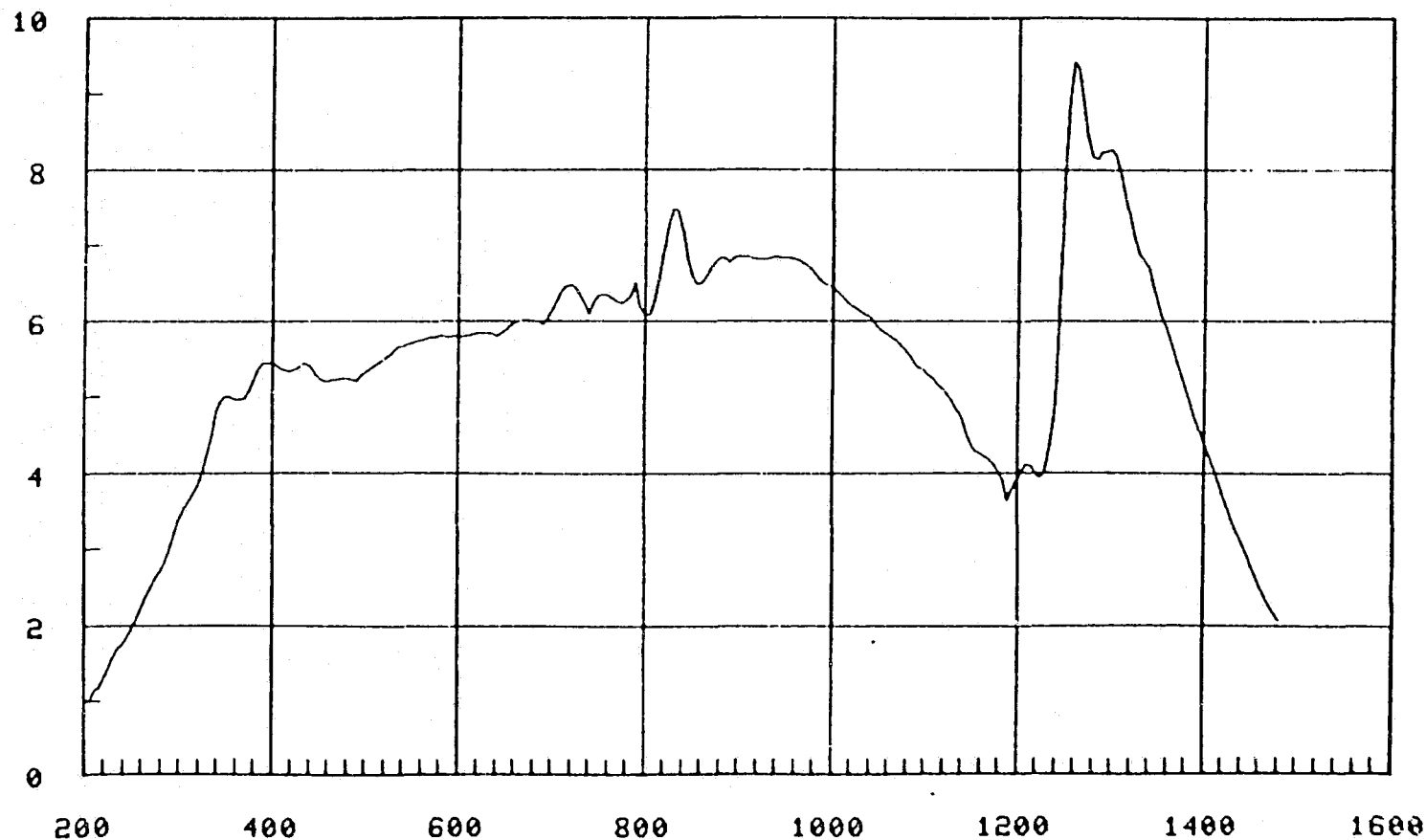
05 03 33

ORIGINAL PRESS IS
OF POOR QUALITY

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

U87T9673A

FEEDING RATE - BULLETS - SEC



TIME - SECONDS

#5 #3 S3

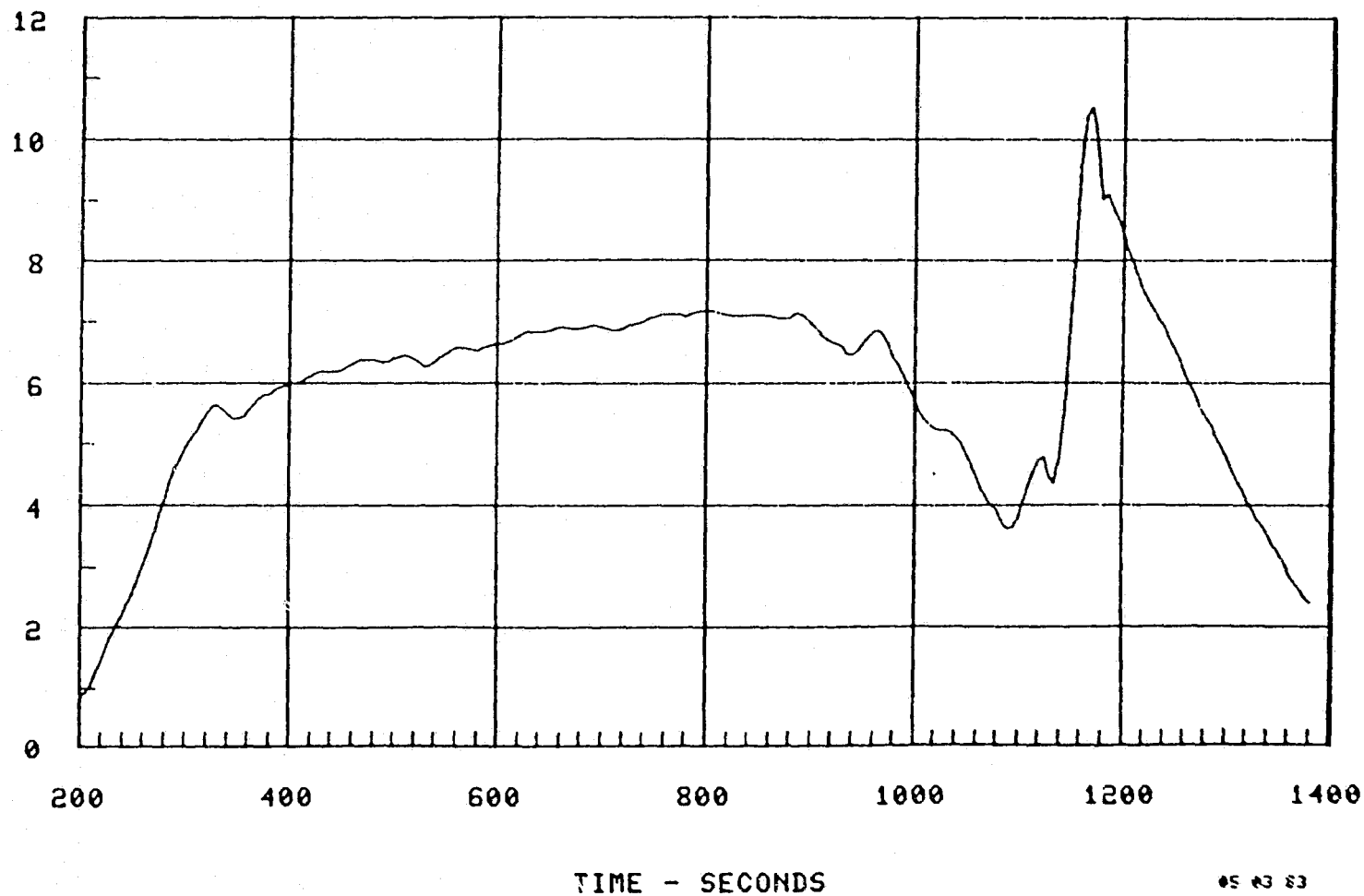
ORIGINAL PAGE IS
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B-142

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

U87T9673A

HEATING RATE - BULB - SEC



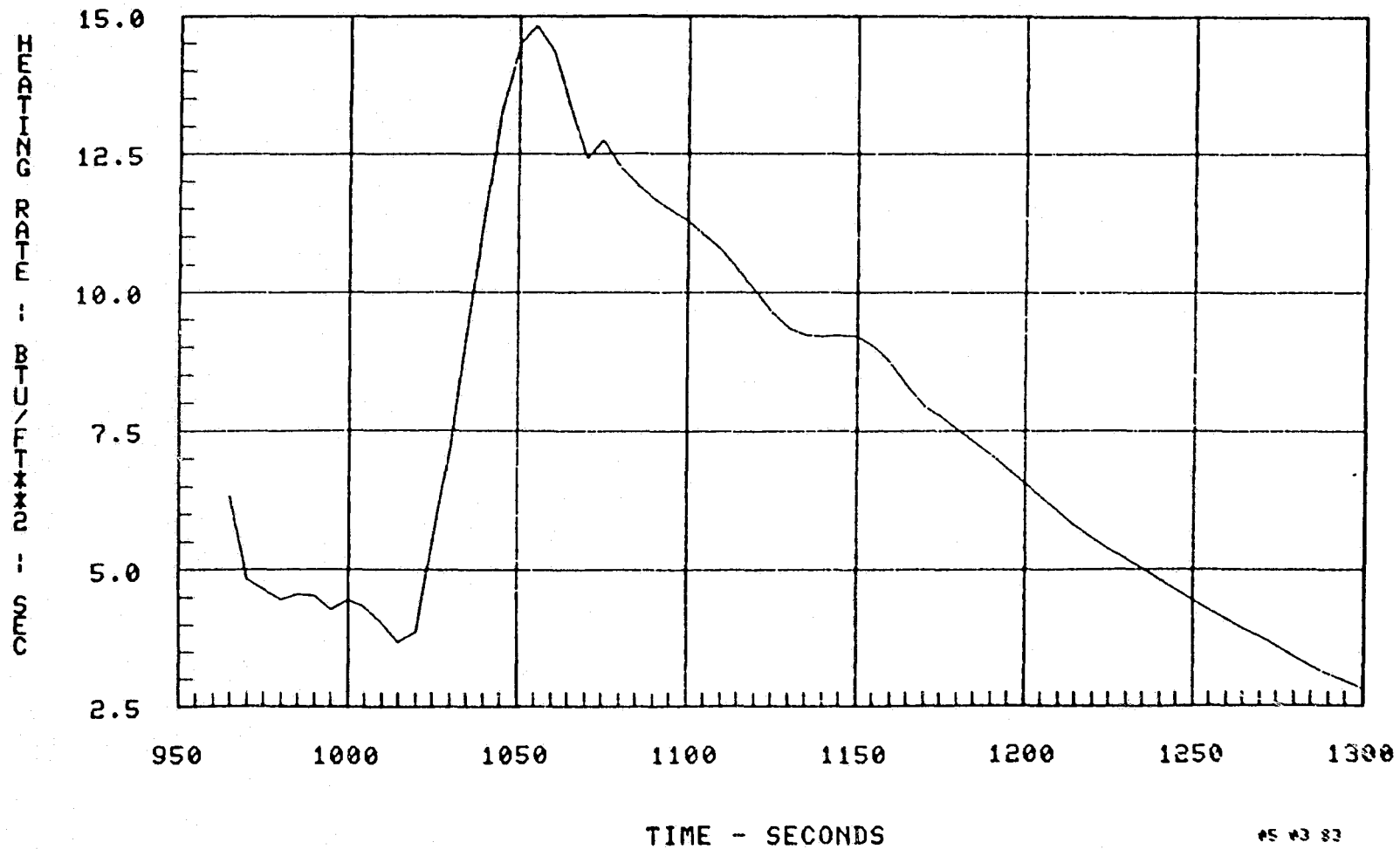
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B-143

05 43 83

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A



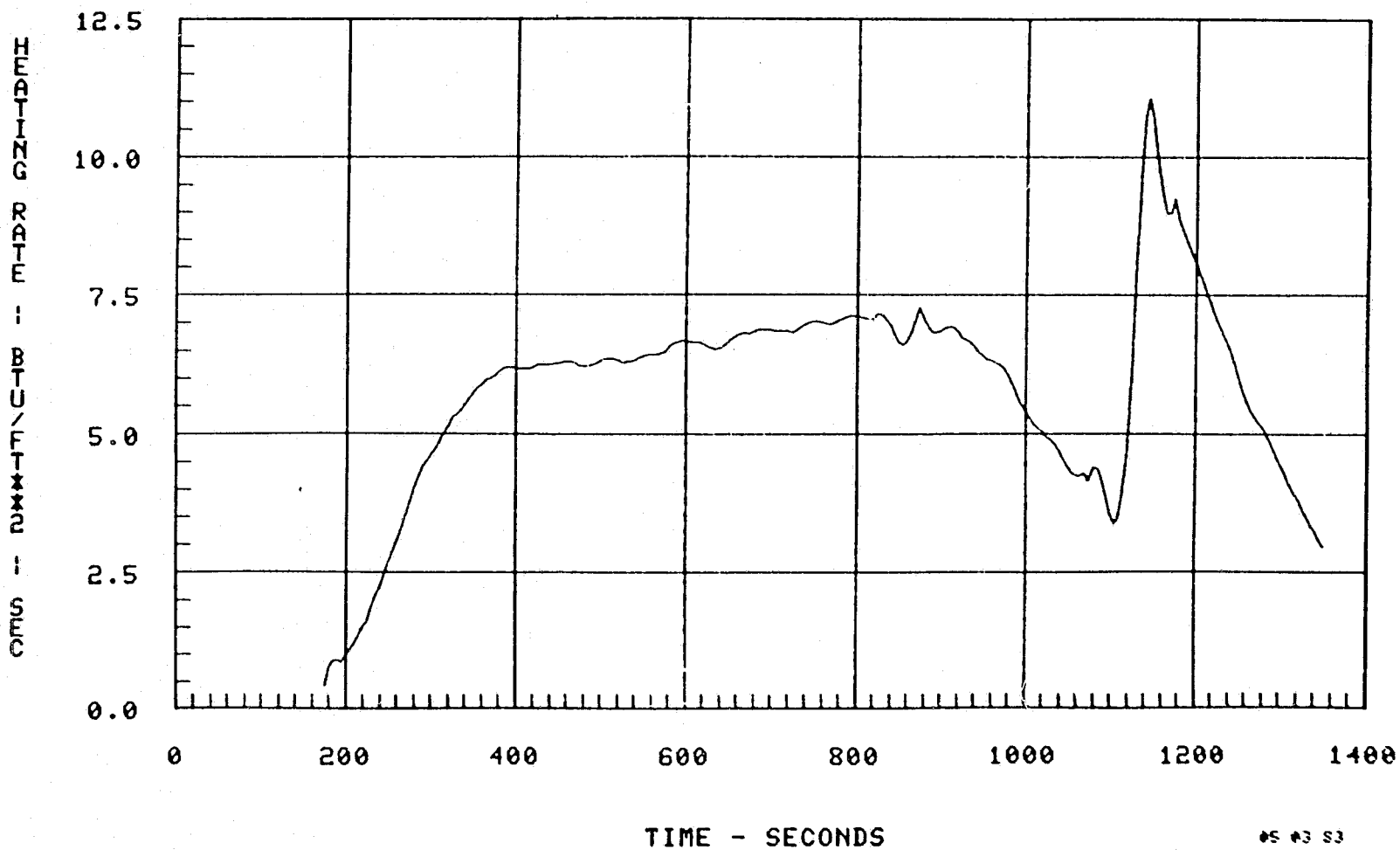
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ORIGINAL PAGE IS
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#5 43 83

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

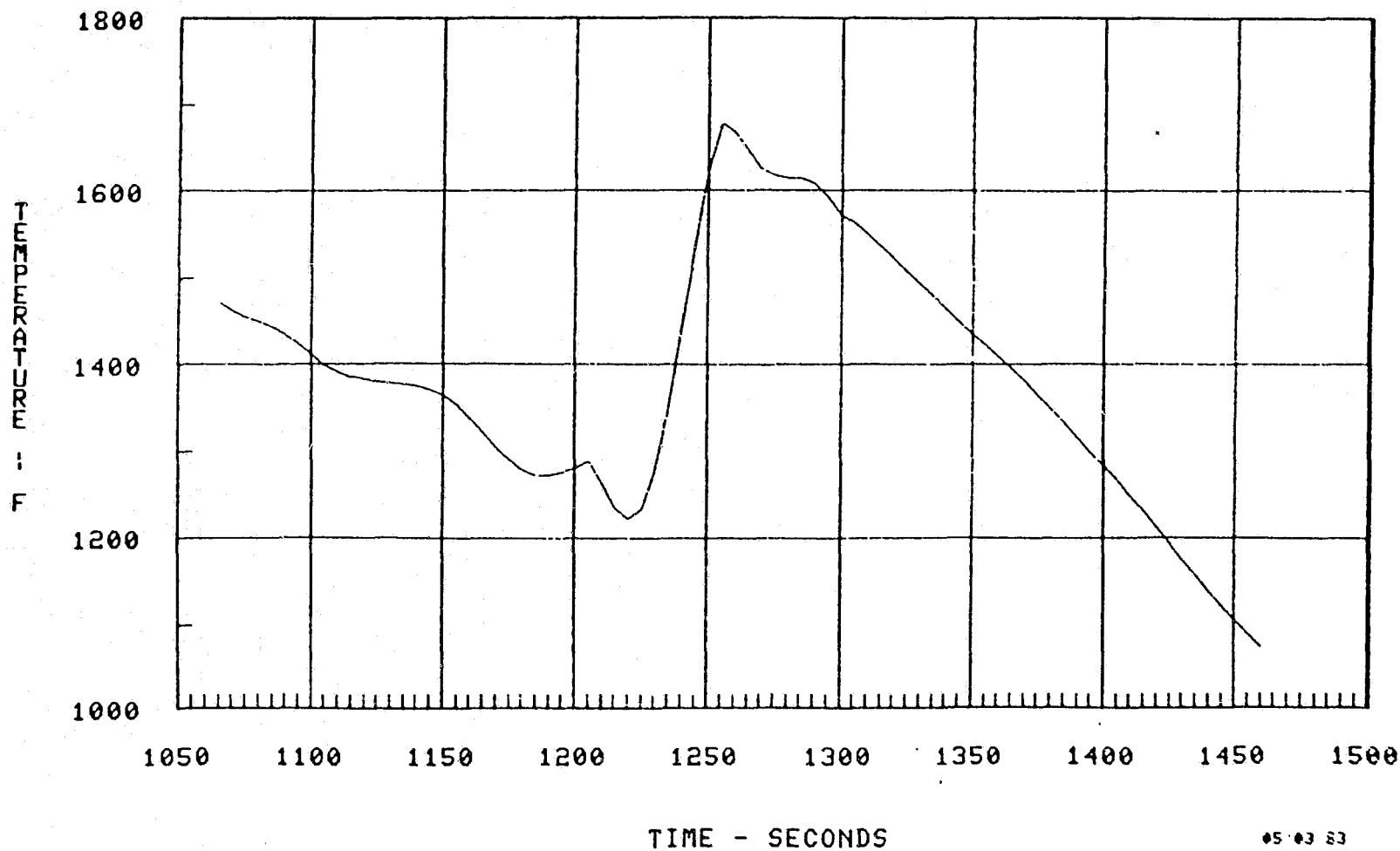
U07T9673A



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STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

U07T9673A



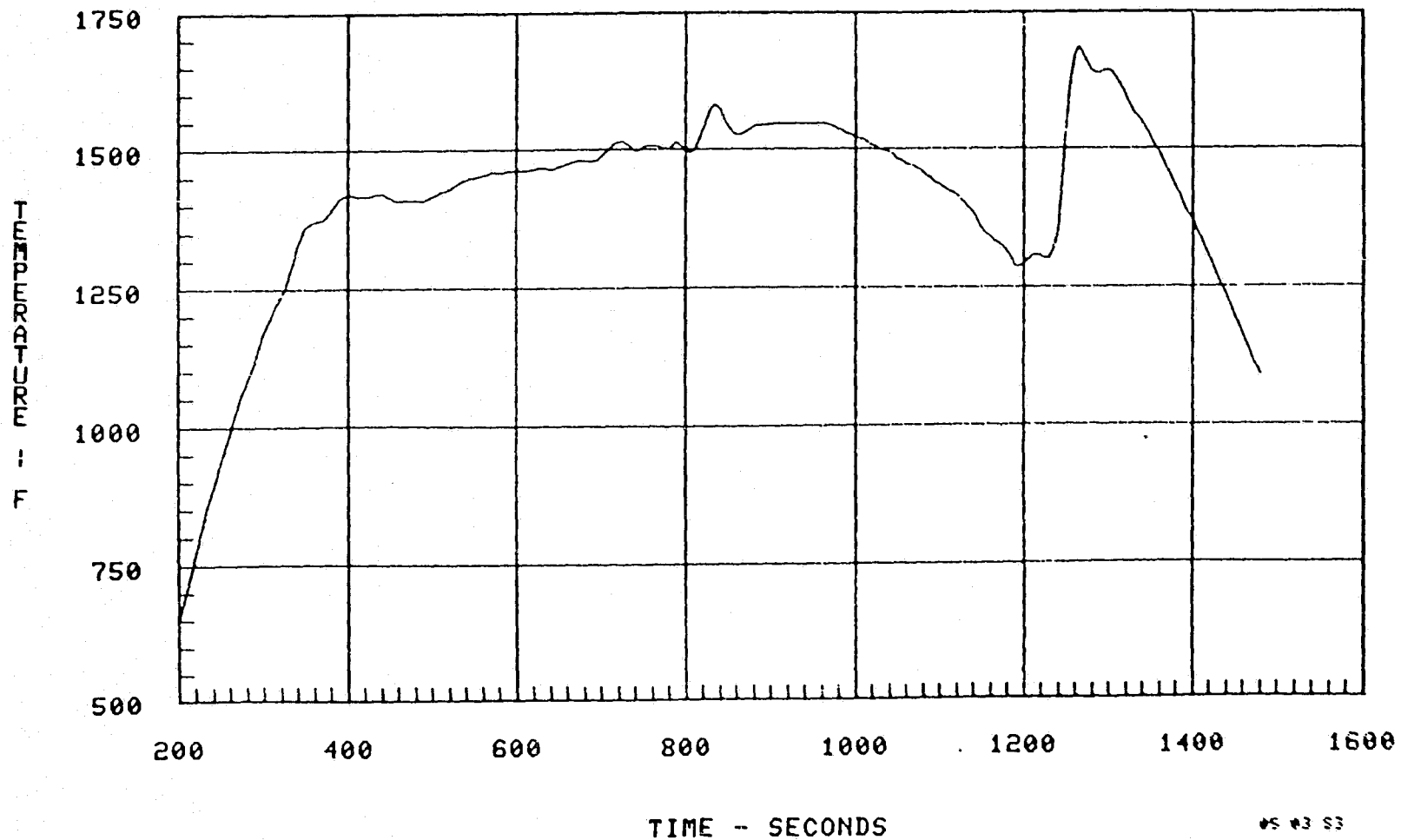
B-146

ORIGINAL PAGE IS
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05 03 83

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

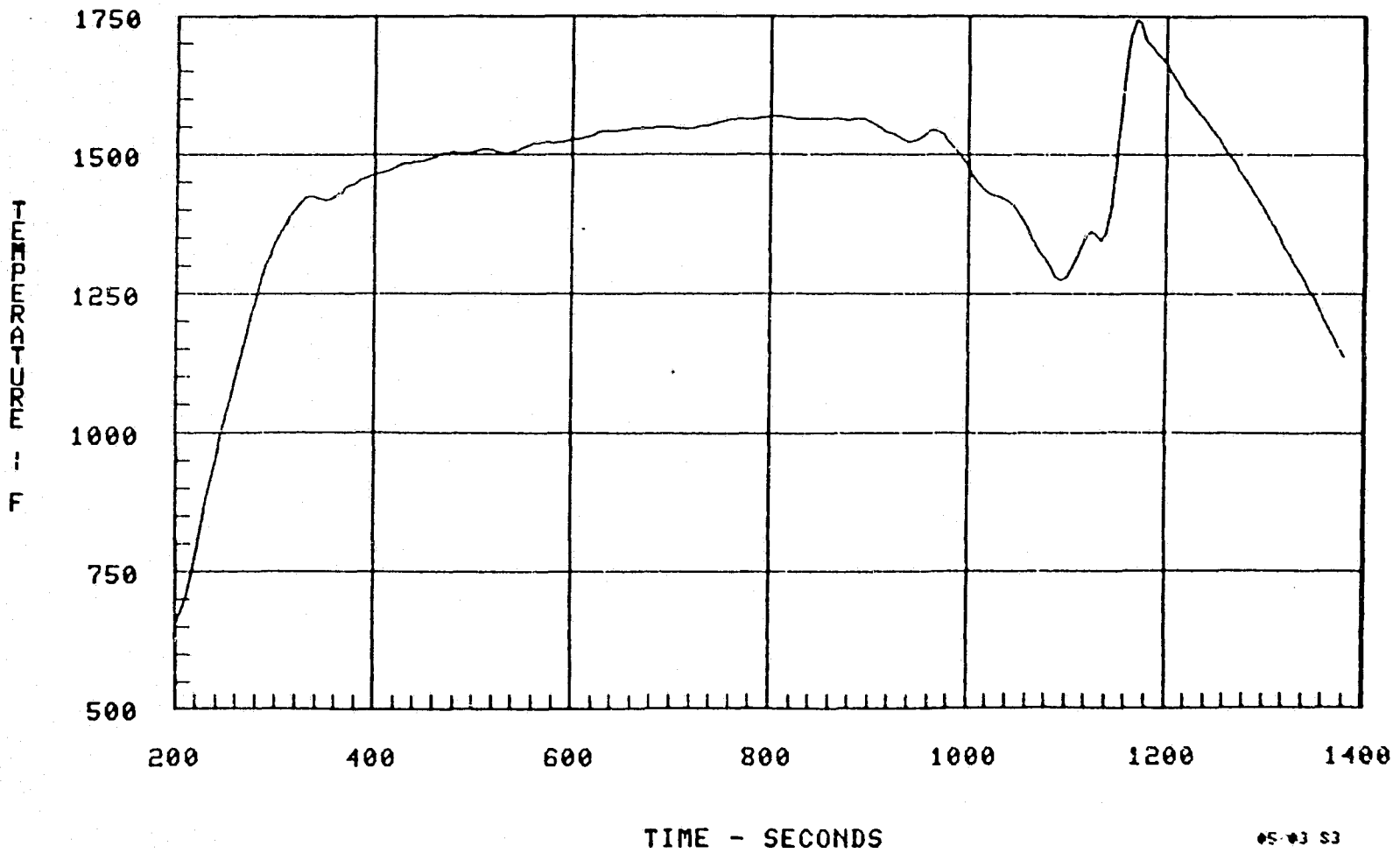
U07T9673A



B-147

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A



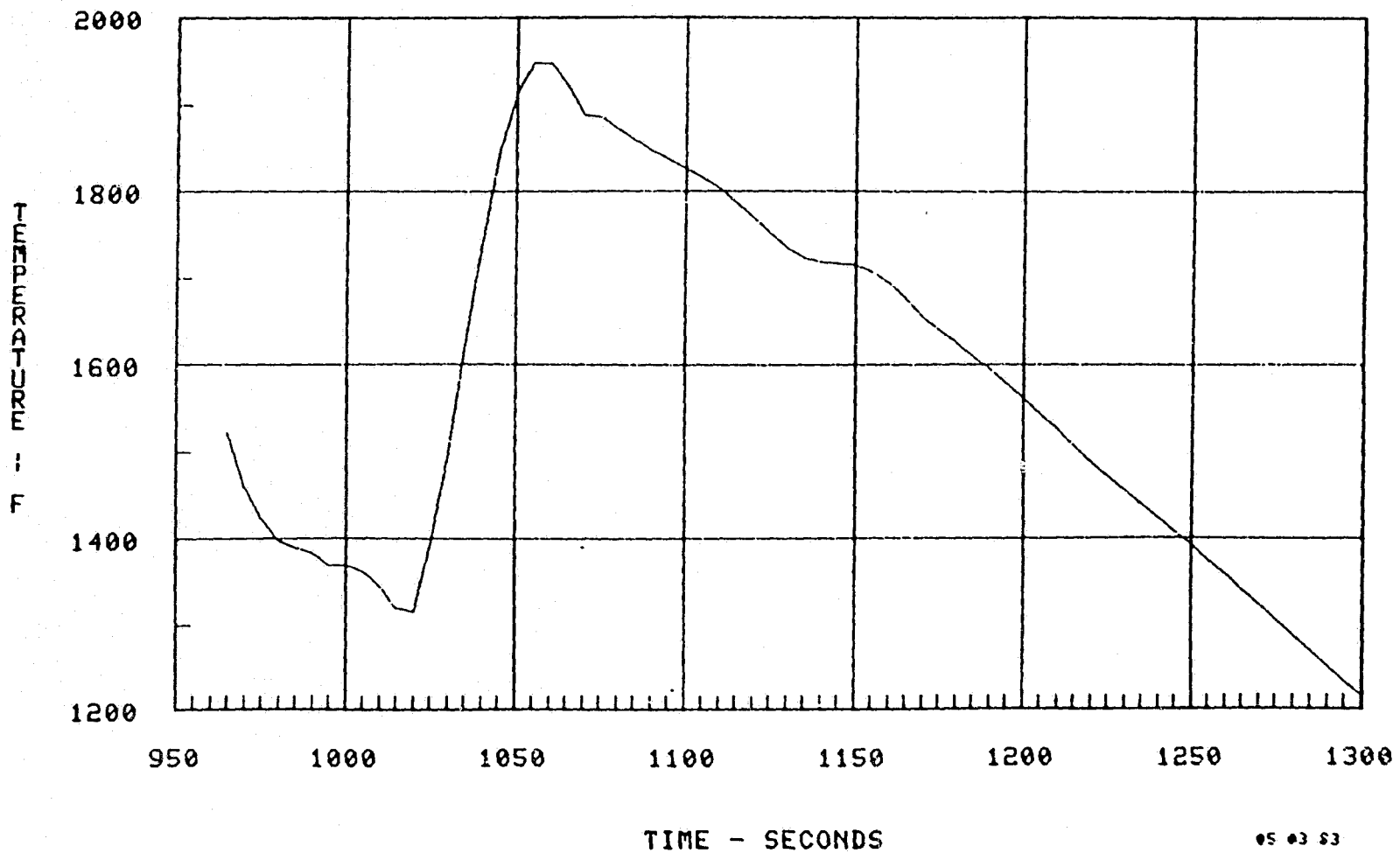
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05-03 S3

B-148

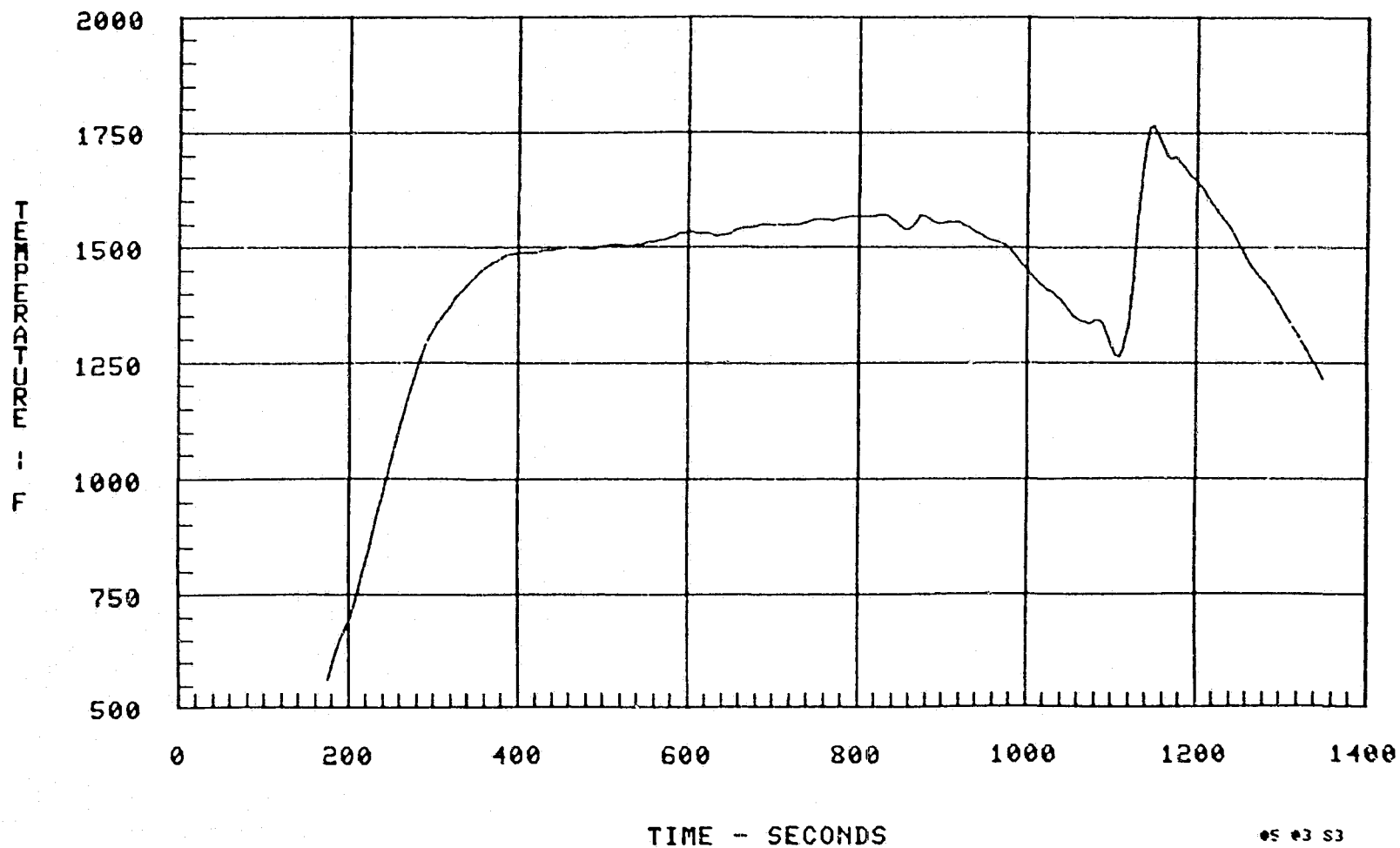
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.61

U07T9673A



STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.61$

U07T9673A



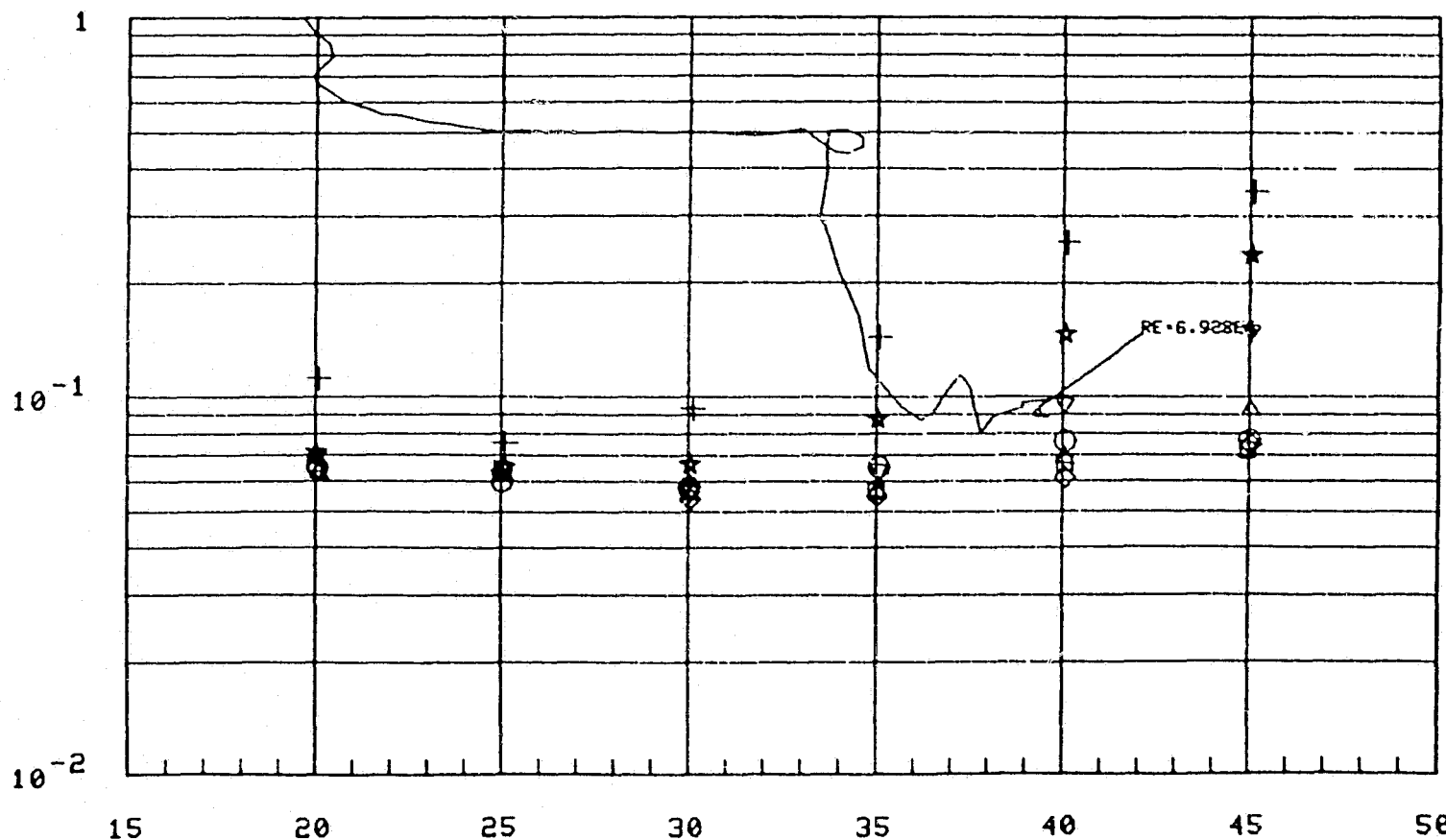
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.64

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OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

U09T9181A/H-REF 1065-1460 SEC

FILE COMPLETION - H/H-QUAL



ANGLE-OF-ATTACK - DEG

05 03 83
BASE TIME • 0949744.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.64

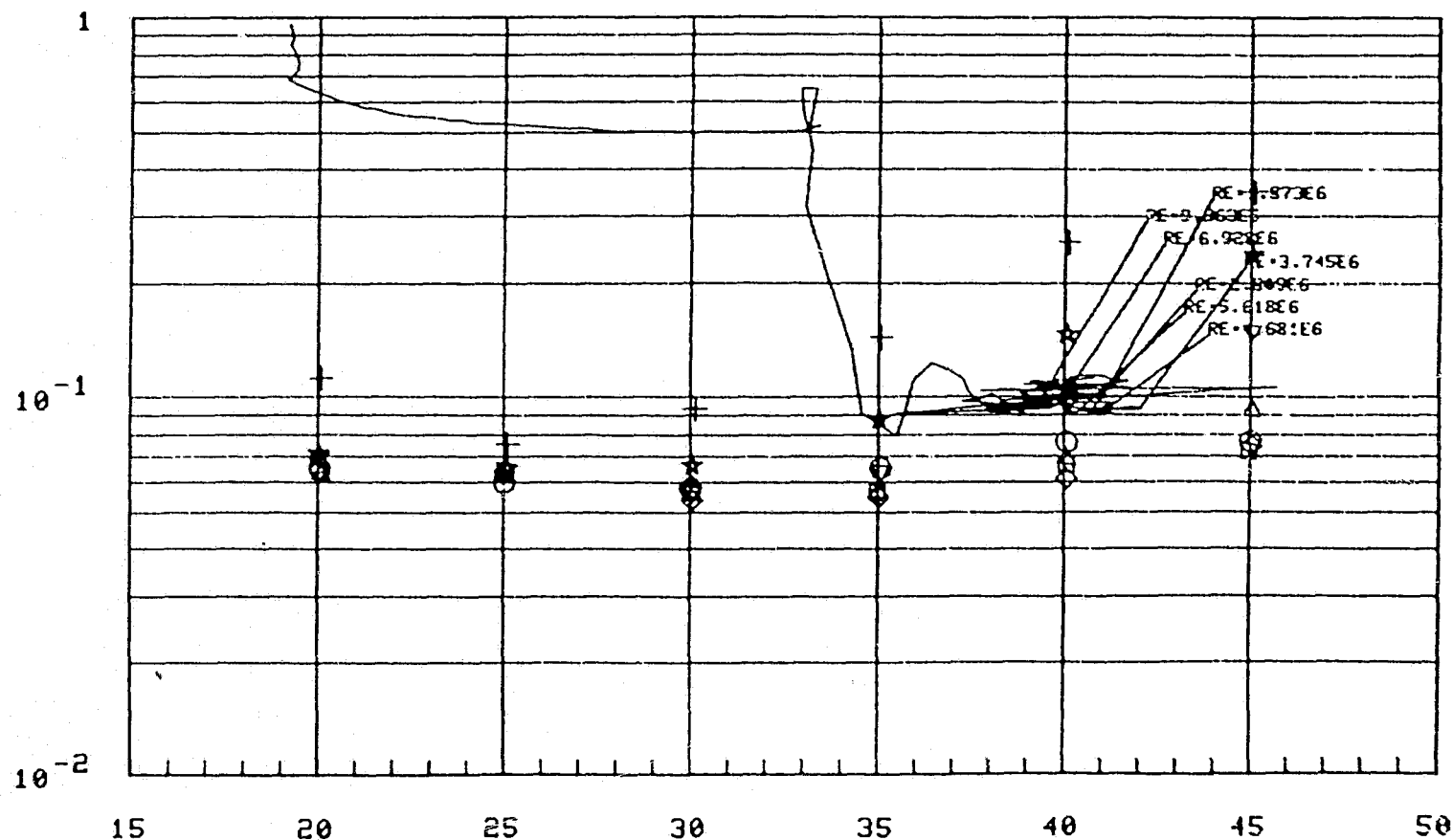
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9181A/H-REF 200-1480 SEC

FILE COWELL - H/H-REF

B-152



ORIGINAL PAGE IS
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

05 03 53
BASE TIME = 27550236.444 SEC.

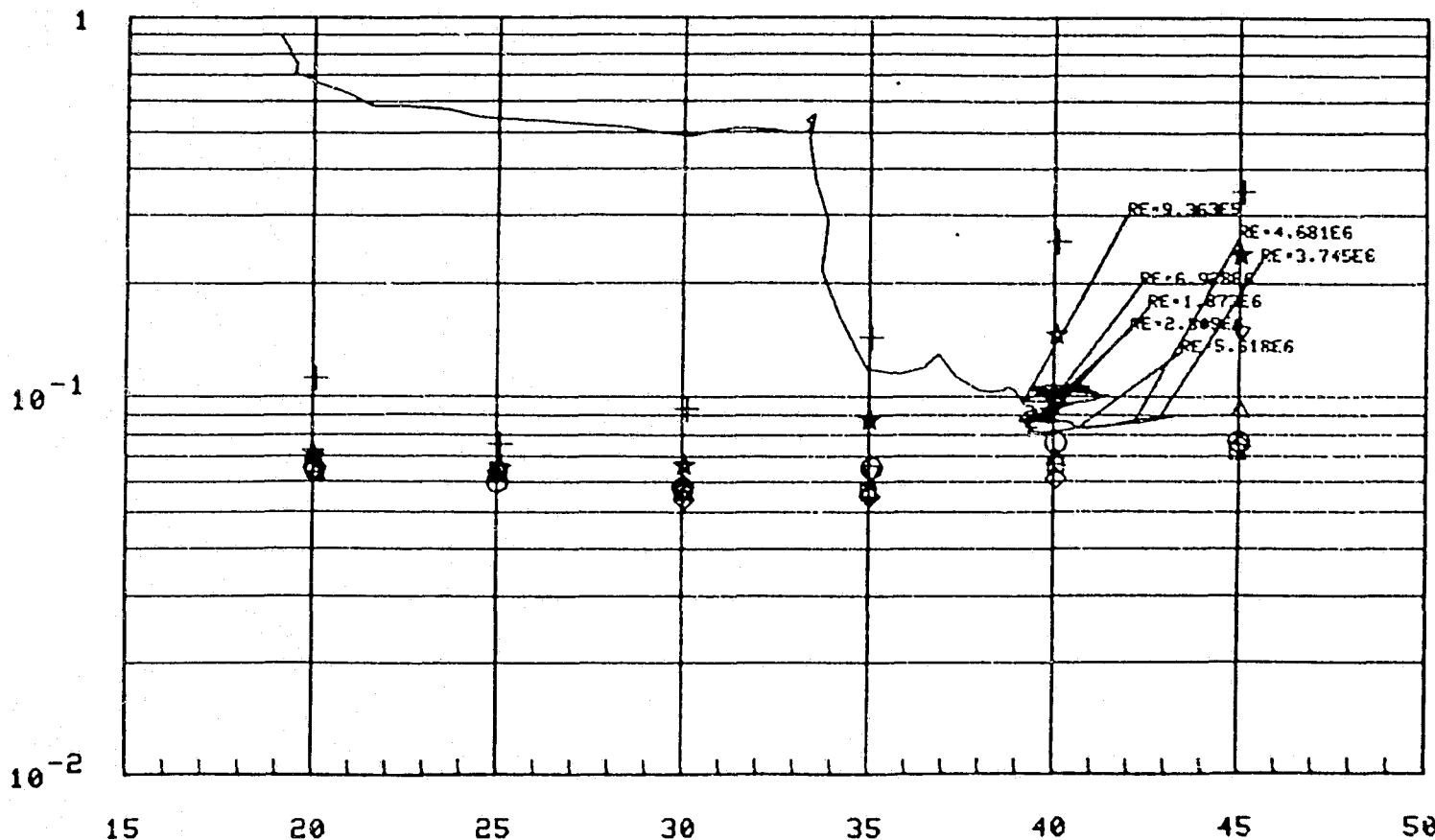
STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.64

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9181A/H-REF 200-1380 SEC

LINE COULDN'T BE PLOTTED



ORIGINAL PAGE IS
OF POOR QUALITY

B-153

ANGLE-OF-ATTACK - DEG

05 03 53
BASE TIME = 07745604.000 SEC.

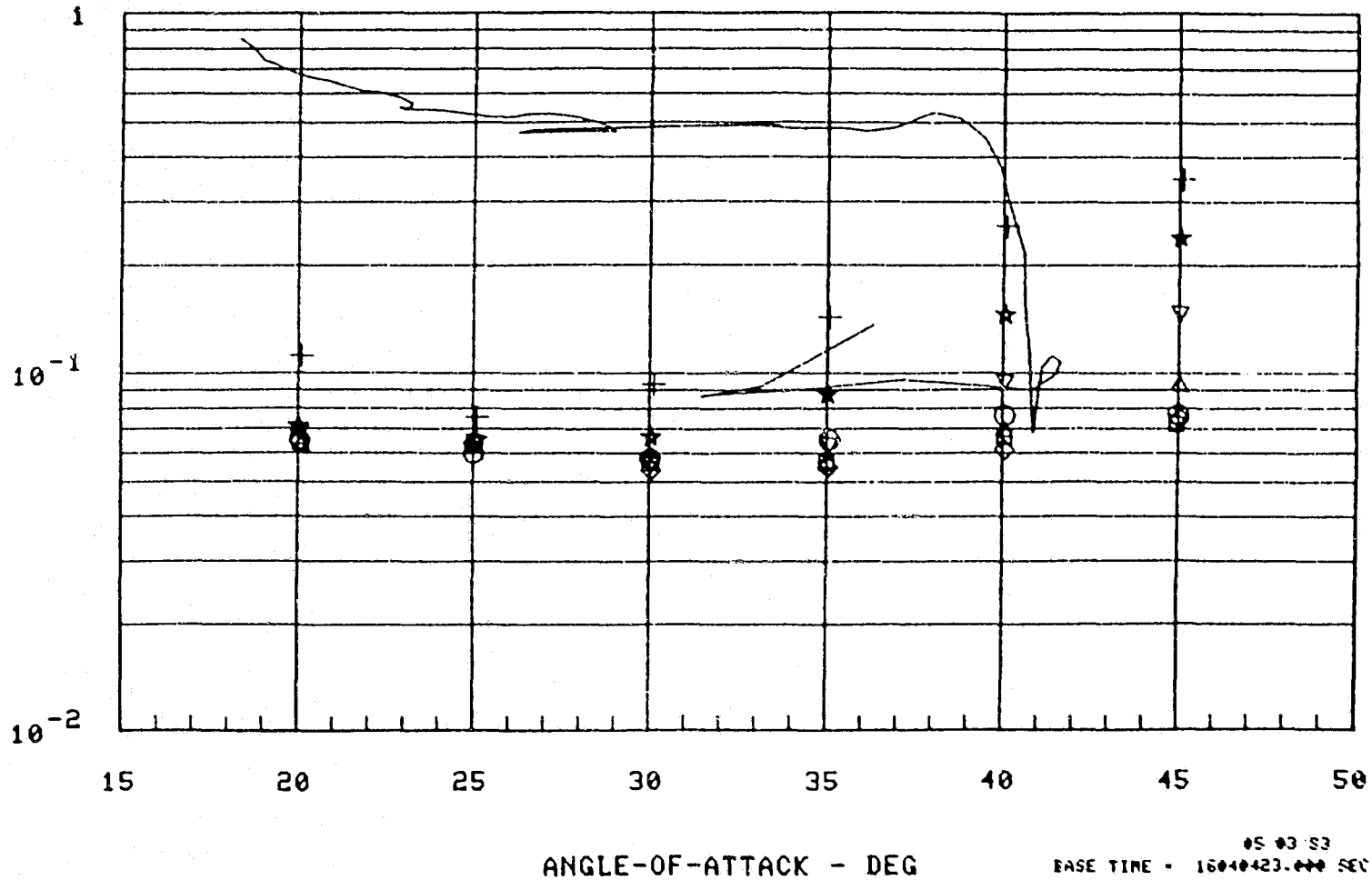
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.64

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OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

U09T9181A/H-REF 965-1300 SEC

LINE COULDN'T BE DRAWN



ORIGINAL PAGE IS
OF POOR QUALITY

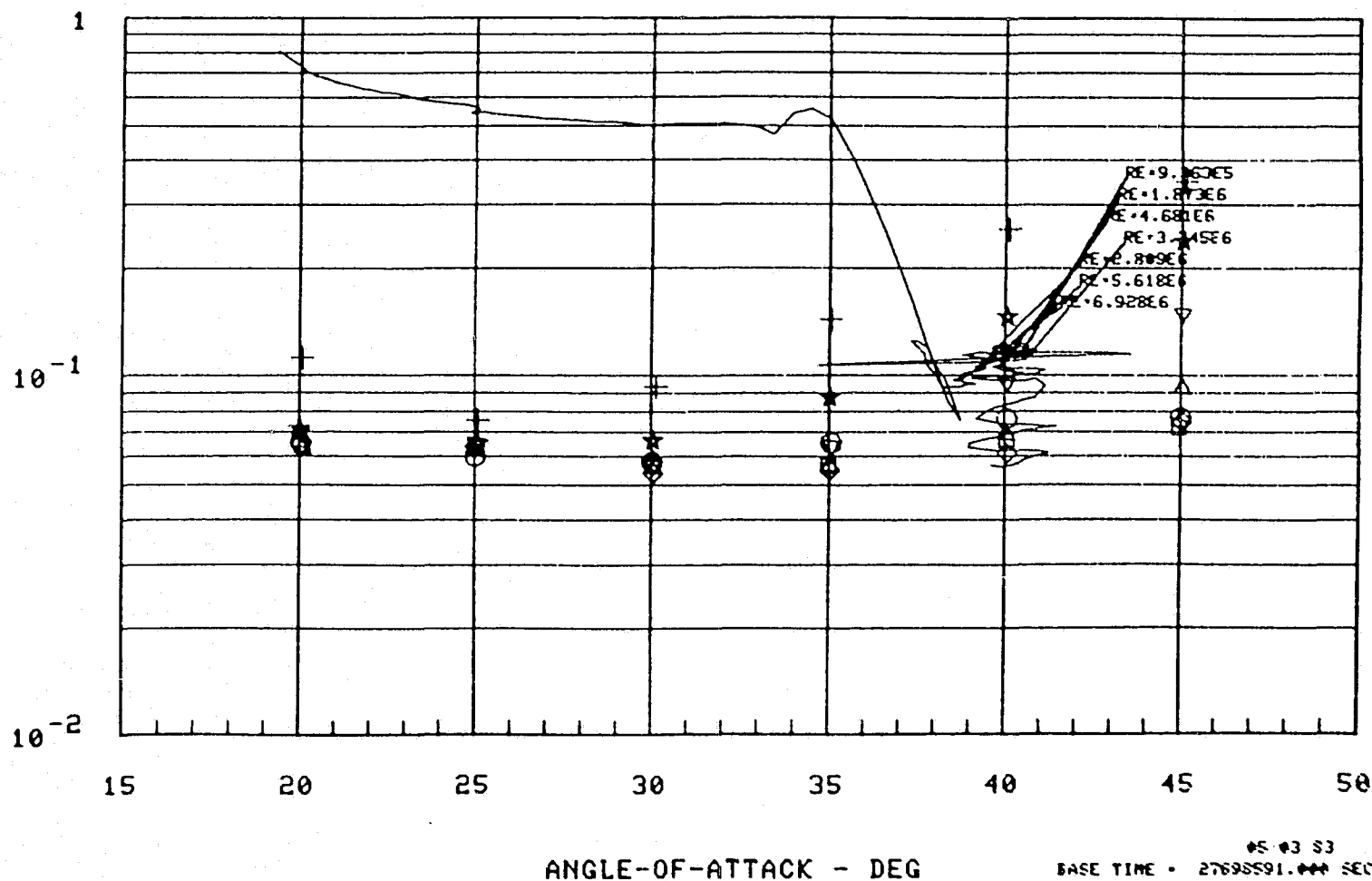
STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.64

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U09T9181A/H-REF 150-1350 SEC

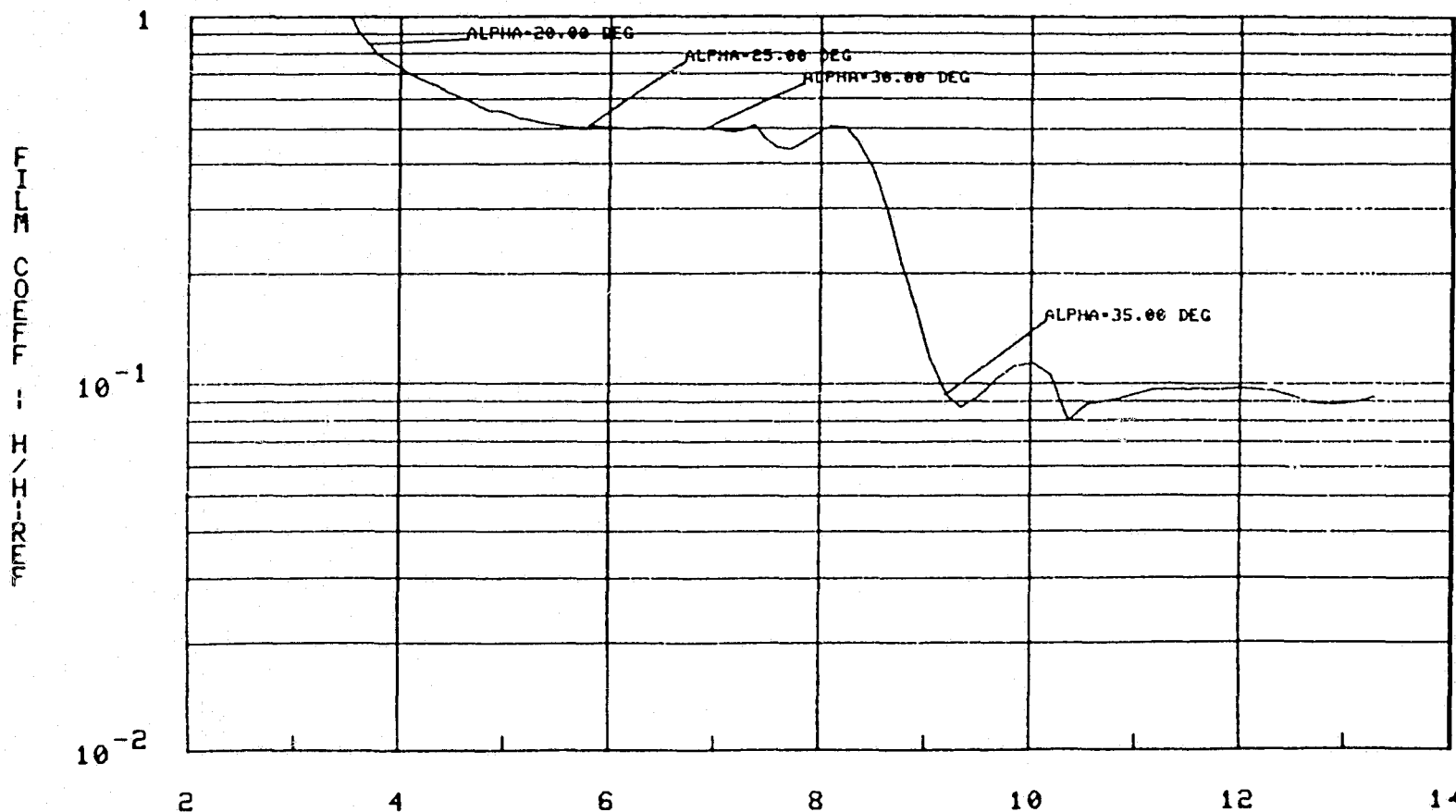
LINE CODE - H/H-REF



ORIGINAL DATA IS
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STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A/H-REF 1065-1460 SEC



B-156

WING COEFFICIENT - H-I-CURVE

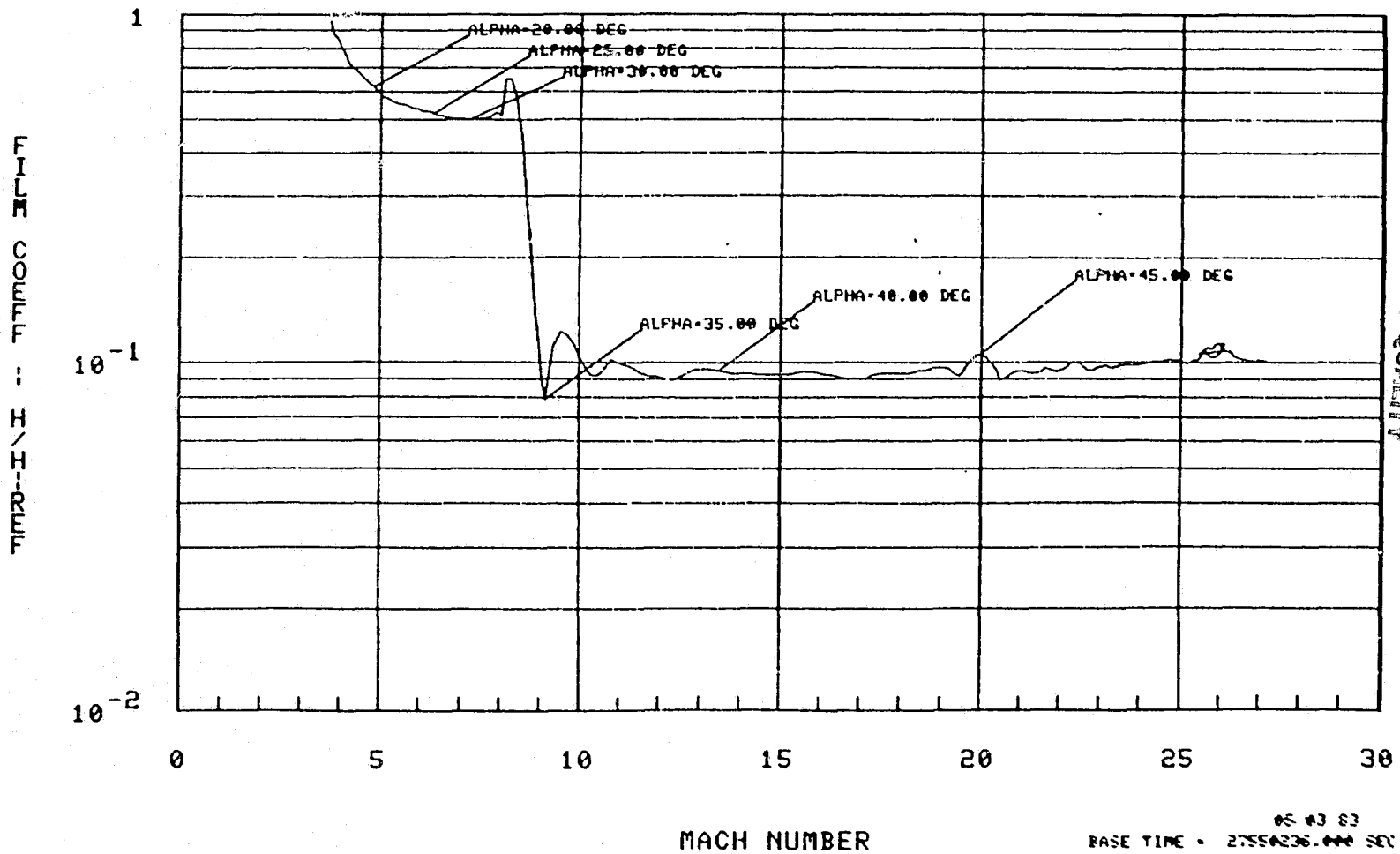
ORIGINAL PAGE IS
OF POOR QUALITY

MACH NUMBER

05 03 83
BASE TIME = 09049744.000 SEC.

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A/H-REF 200-1480 SEC

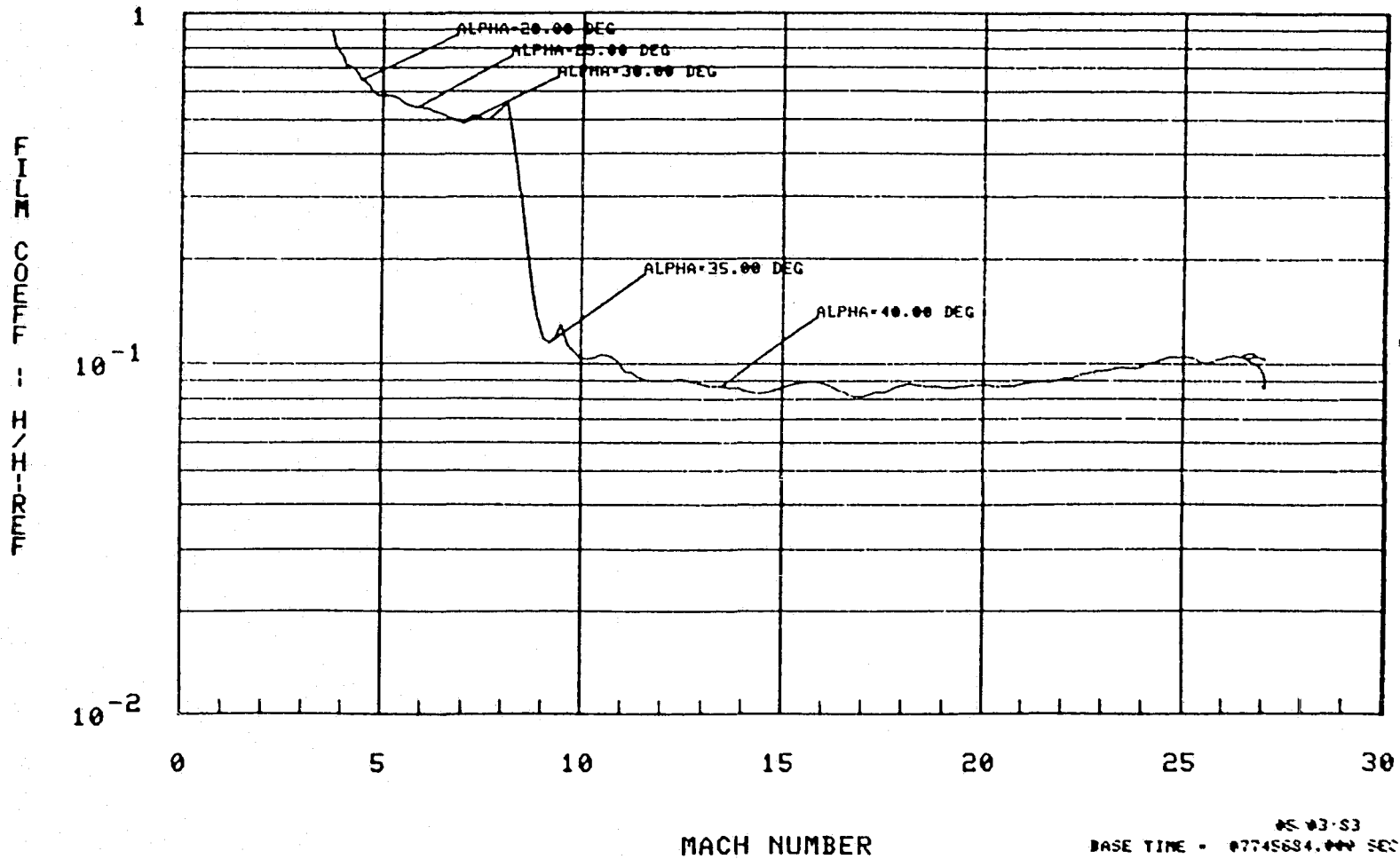


B-157

OF FROM QUALITY

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.64$

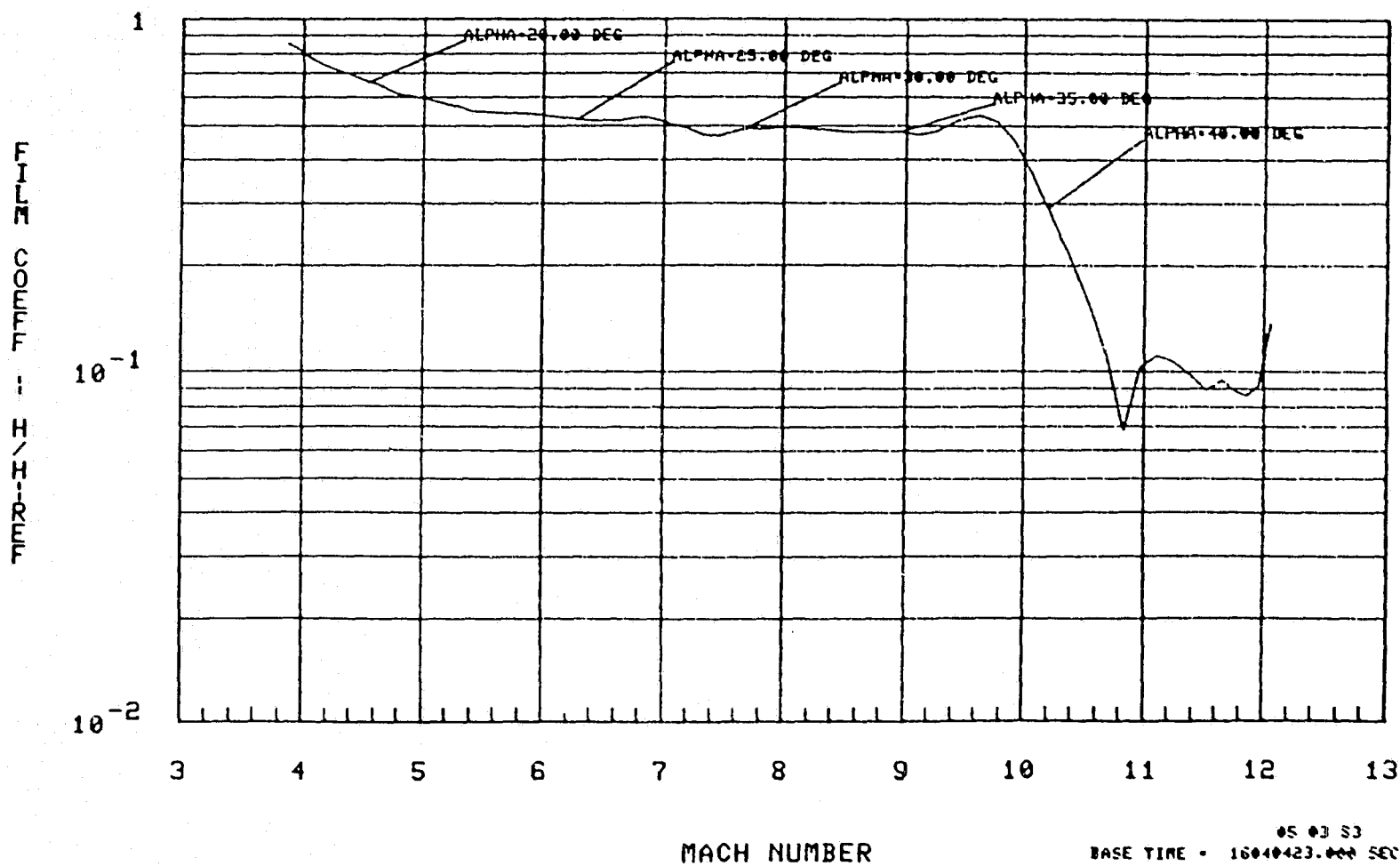
U09T9181A/H-REF 200-1380 SEC



B-158

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.64

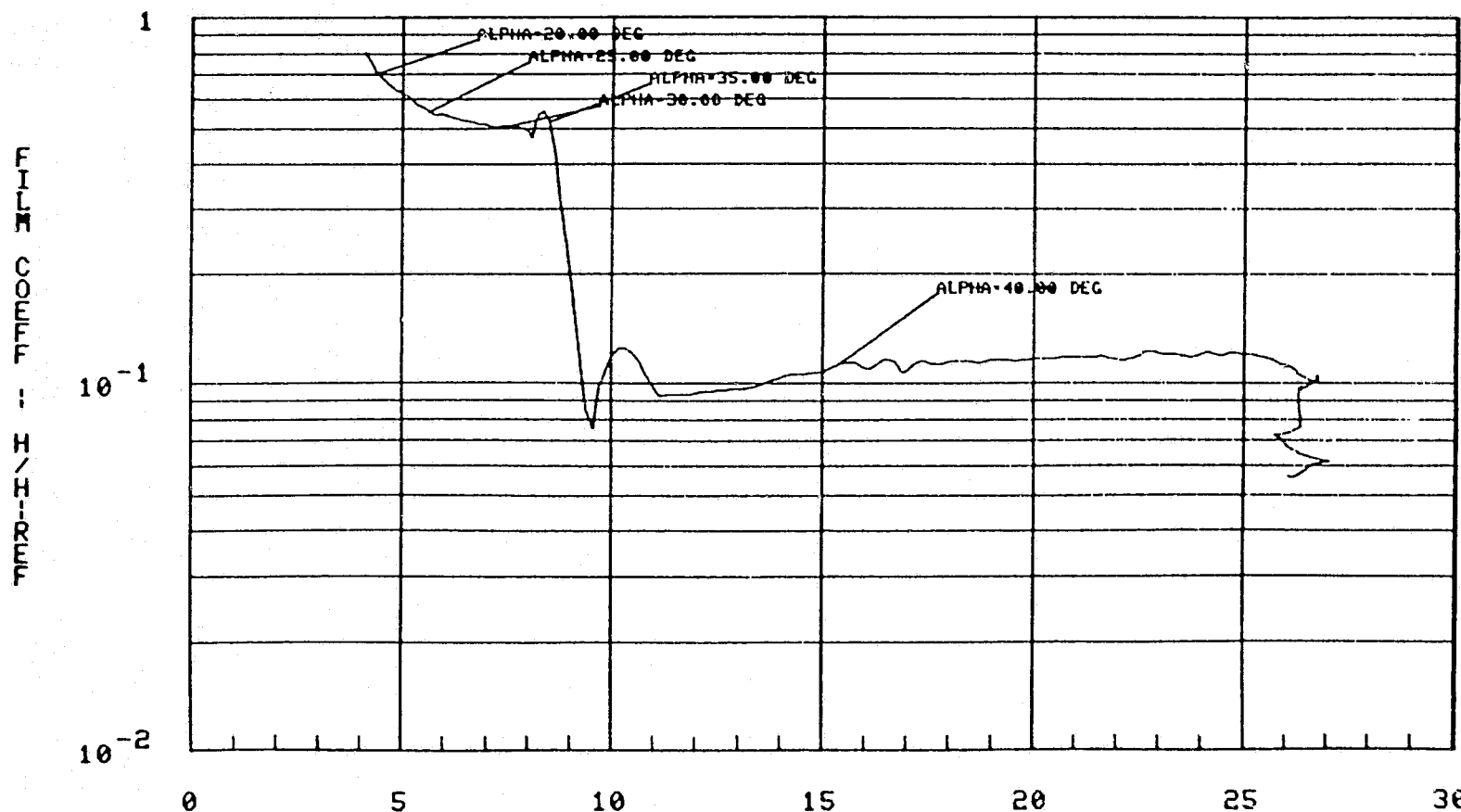
U09T9181A/H-REF 965-1300 SEC



ORIGINAL PAGE IS
OF POOR QUALITY

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A/H-REF 150-1350 SEC



B-160

H/H-REF

MACH NUMBER

05 03 83
BASE TIME = 27690591.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.64

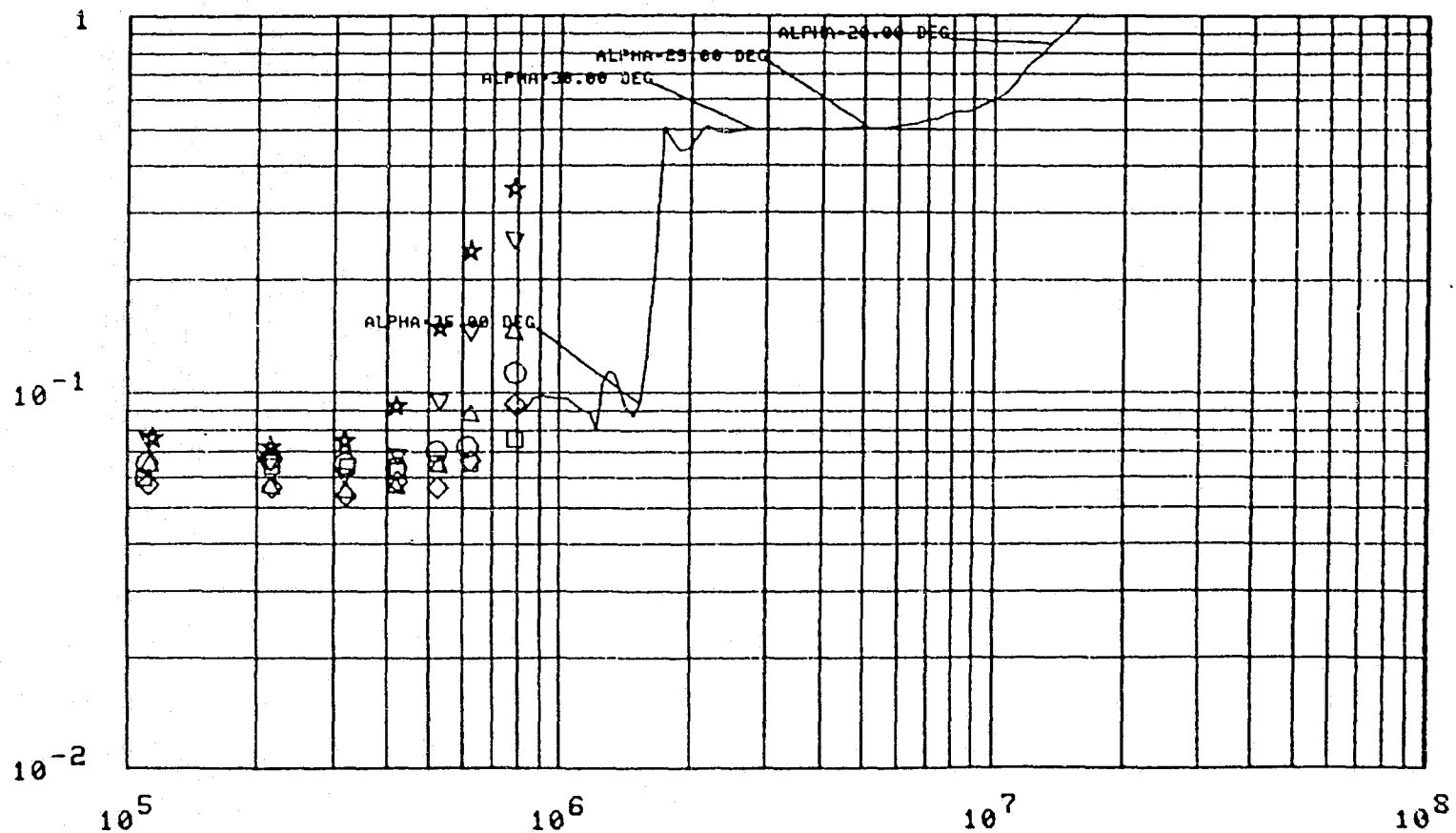
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U09T9181A/H-REF 1065-1460 SEC

FILE C0011 - I/I-RUL

B-167



REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME = 09049744.000 SEC.

ORIGINAL FILED
OF 1065-1460

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.64

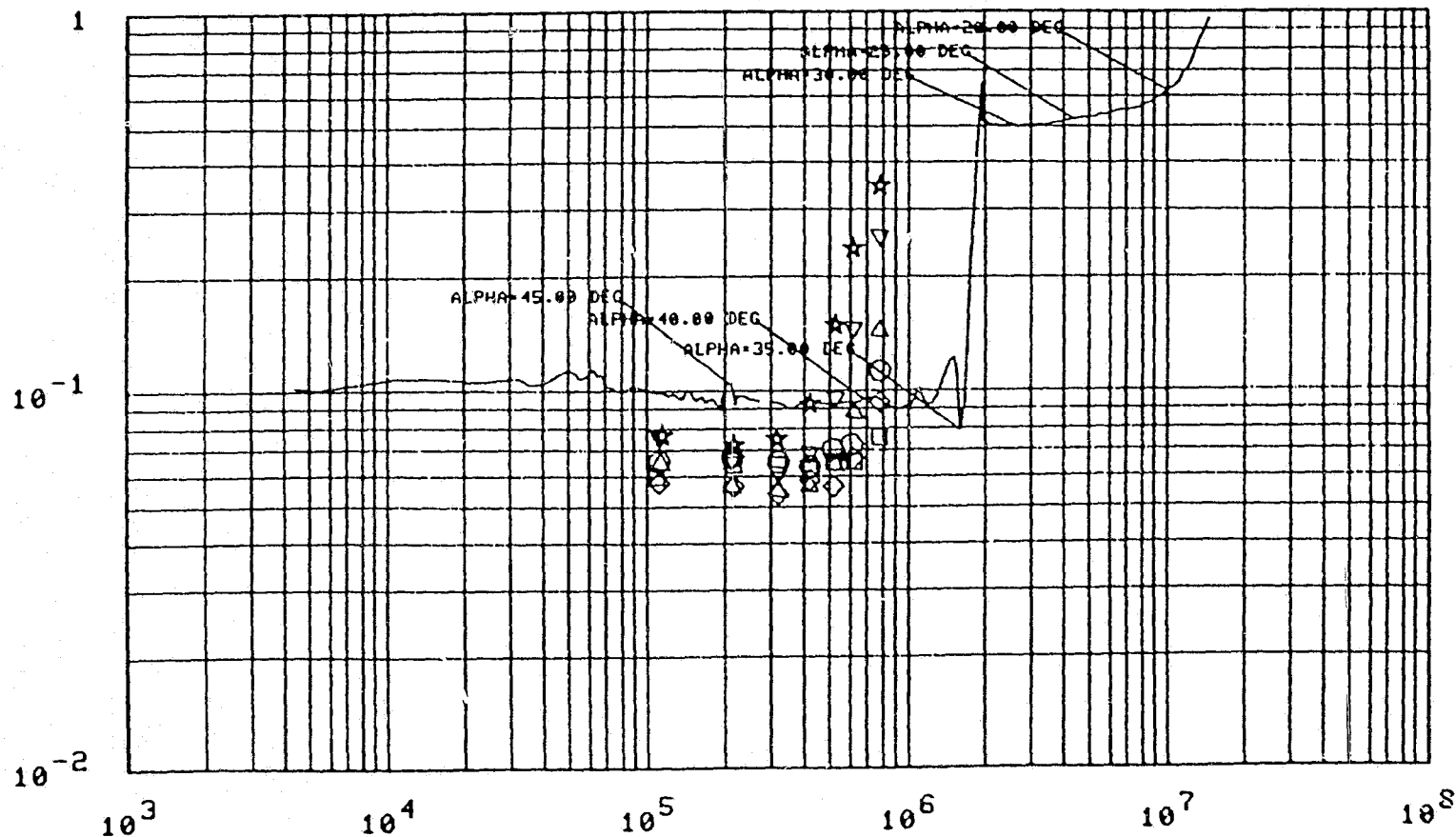
U09T9181A/H-REF 200-1480 SEC

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

FILE CODE: H-H-REF

B-162



REYNOLDS NUMBER (NS)

BASE TIME = 27550236.444 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.64

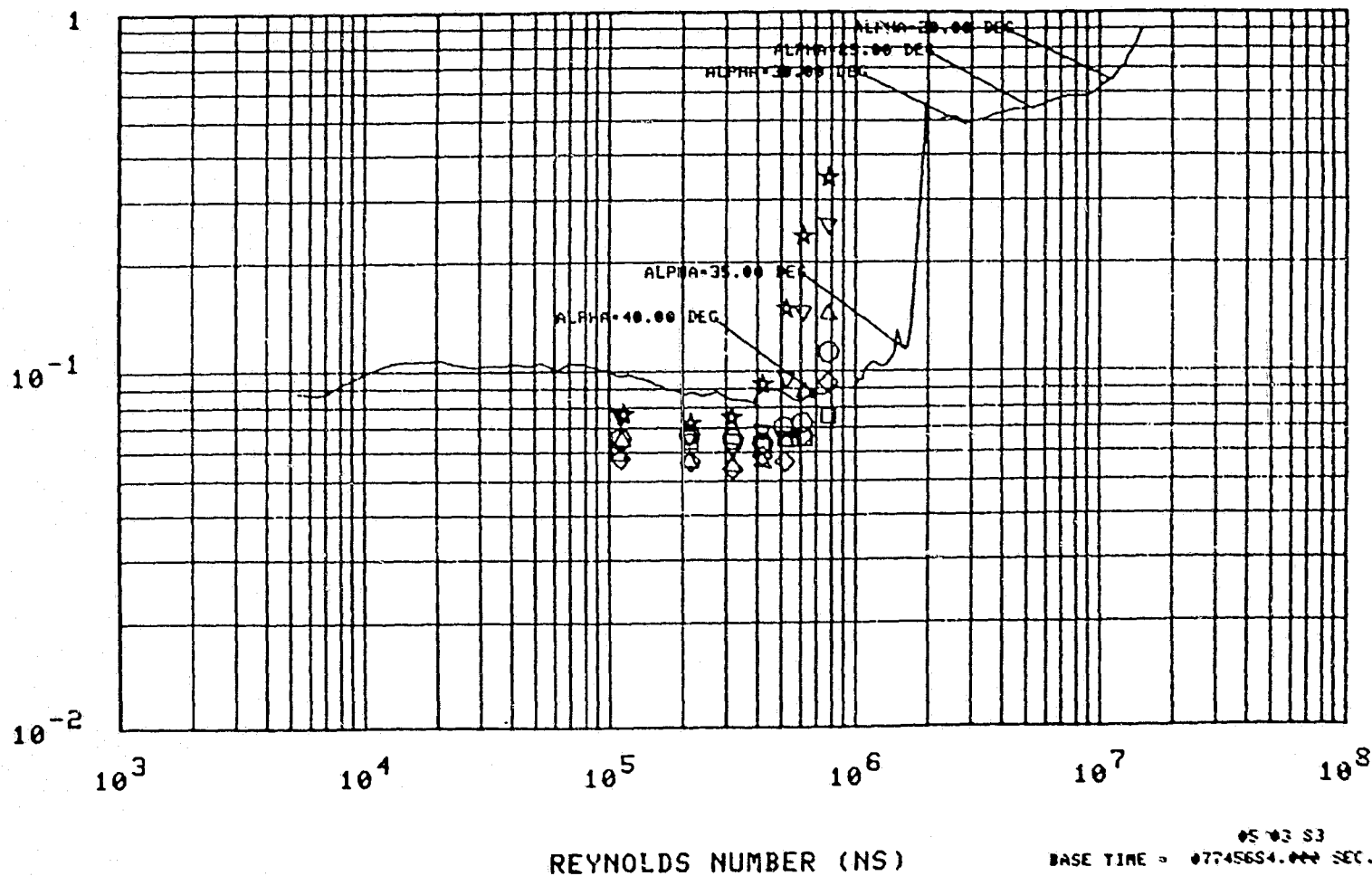
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U09T9181A/H-REF 200-1380 SEC

FILE CODE - H/H-REF

B-163



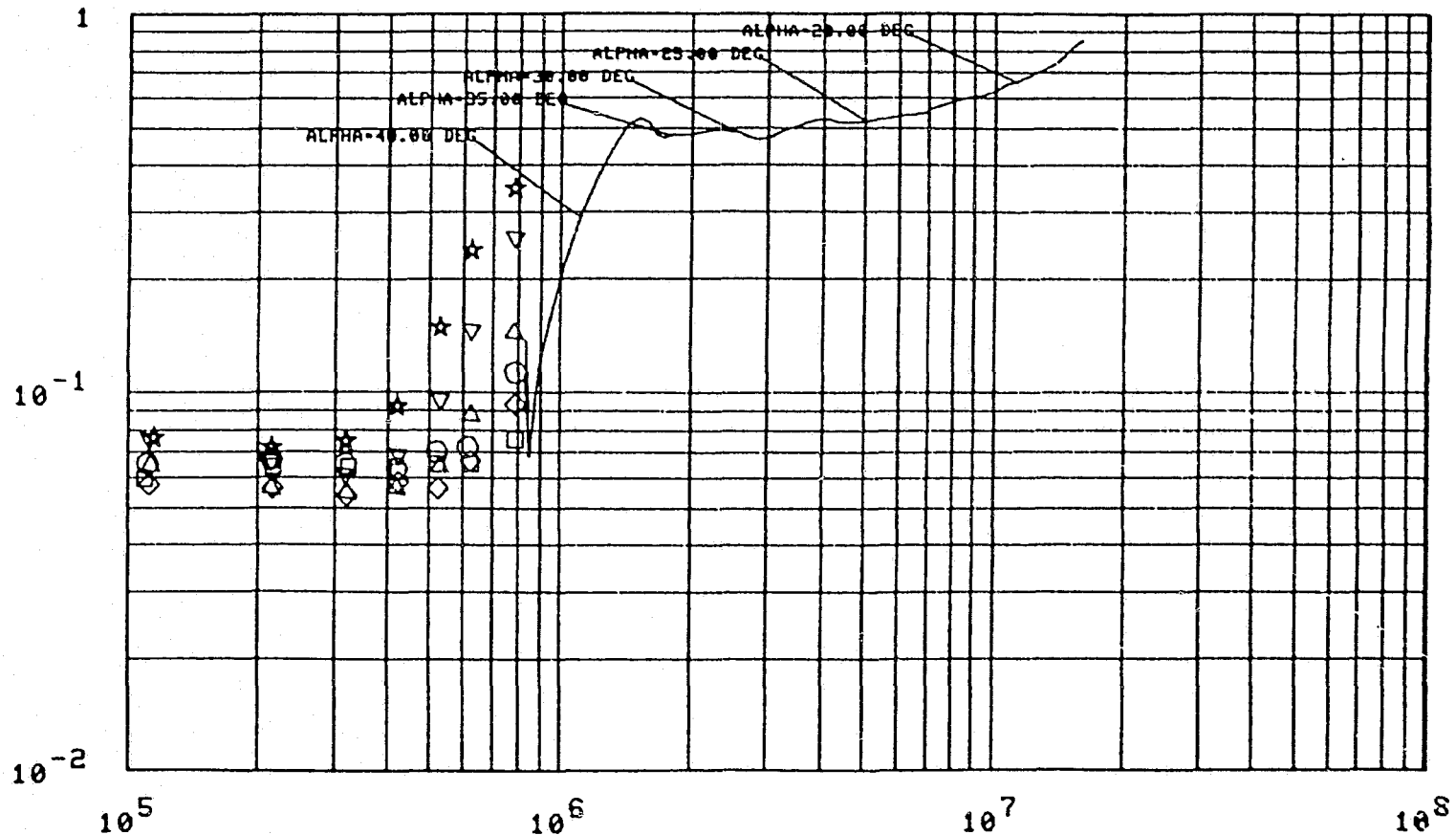
STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.64$

U09T9181A/H-REF 965-1300 SEC

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

TIME COULDN'T BE RUN



CIRCUIT LOGS IN
OF POOR QUALITY

REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME = 16040423.000 SEC.

B-164

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.64$

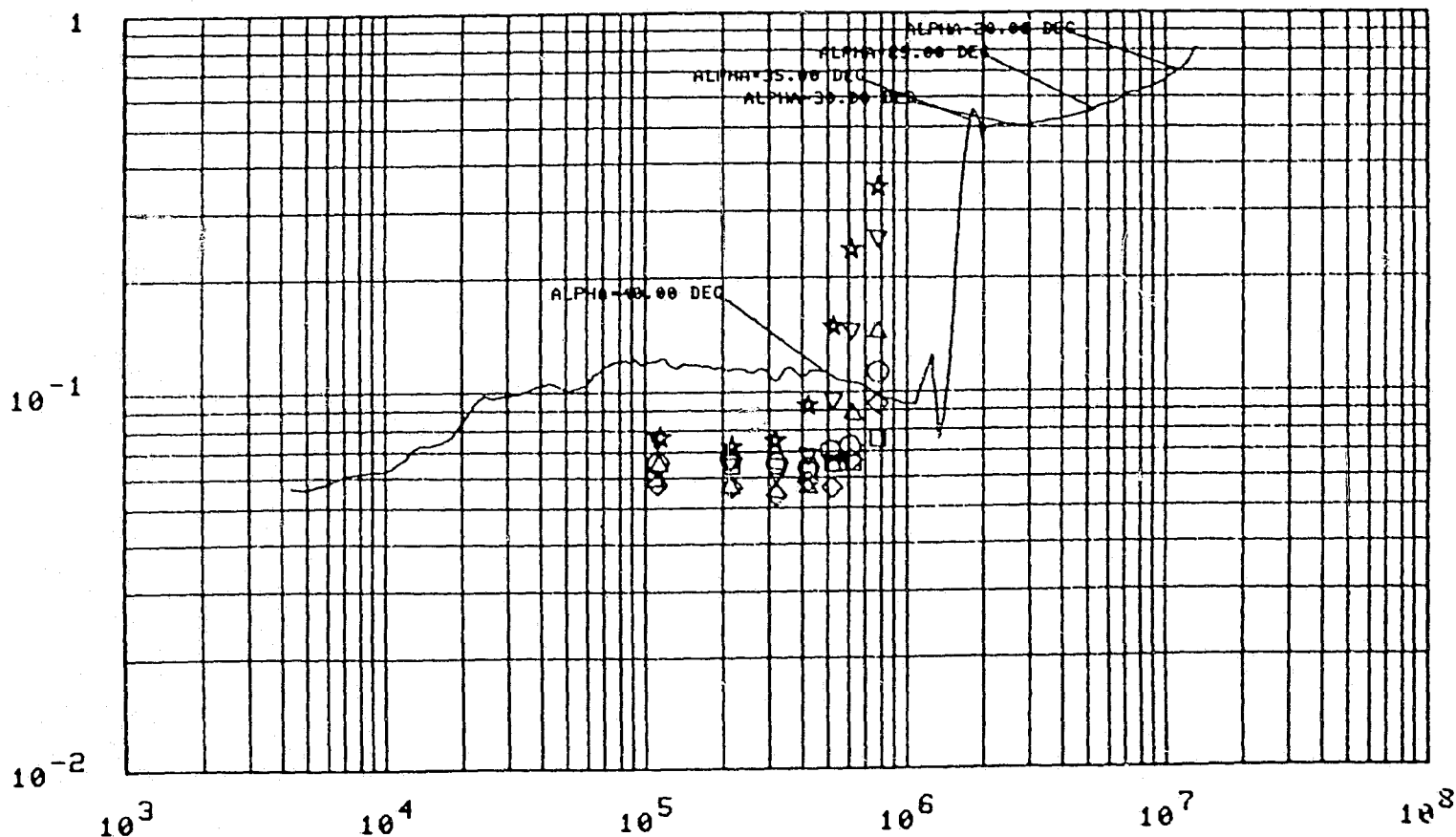
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U09T9181A/H-REF 150-1350 SEC

FILE CODE: H/H-REF

B-165



ORIGINAL PAGE IS
OF POOR QUALITY

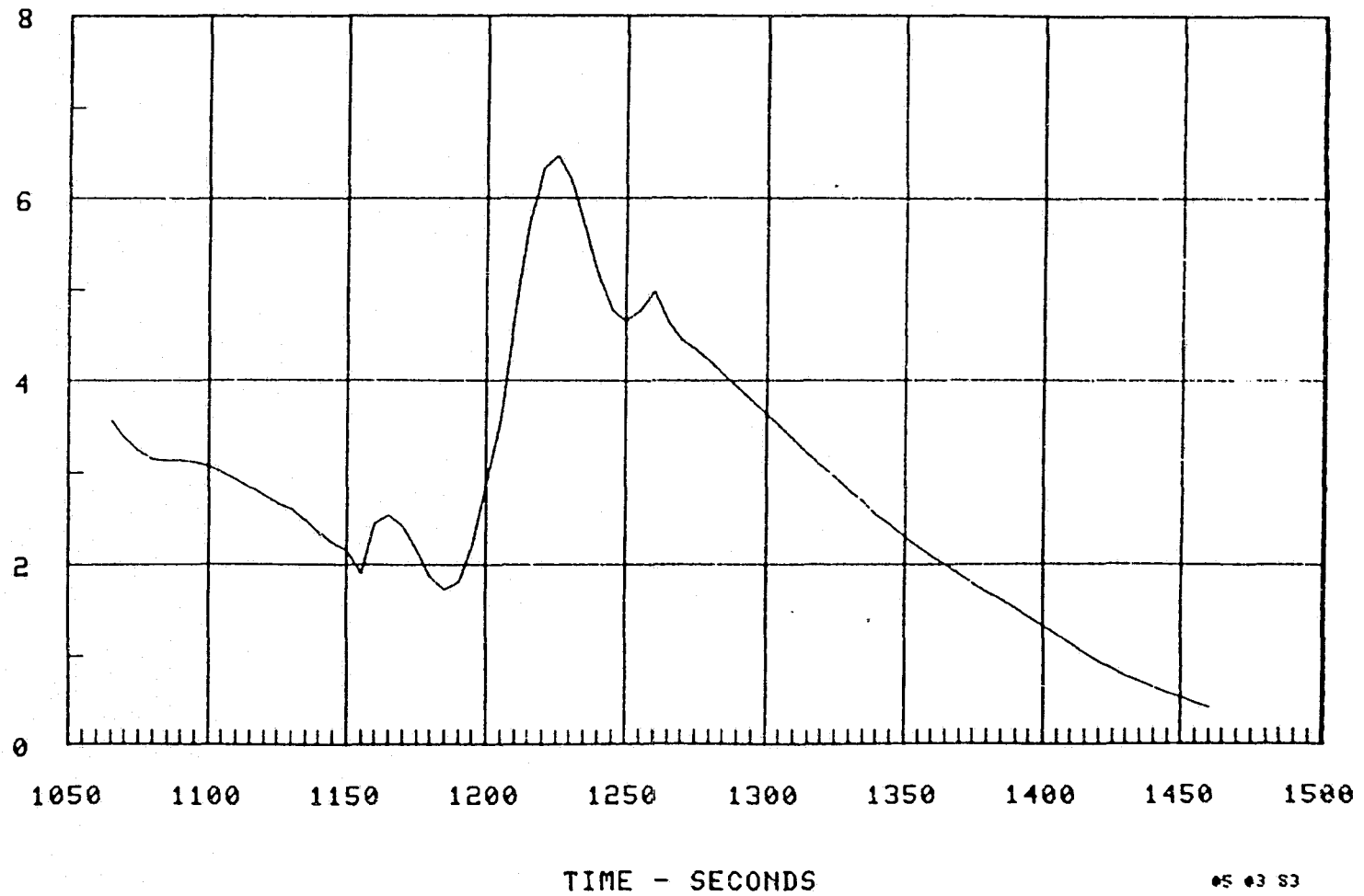
REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME = 27695591.000 SEC.

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.64$

U09T9181A

HEATING RATE - BTU/FT² - SEC



ORIGINAL PAGE IS
OF POOR QUALITY

B-166

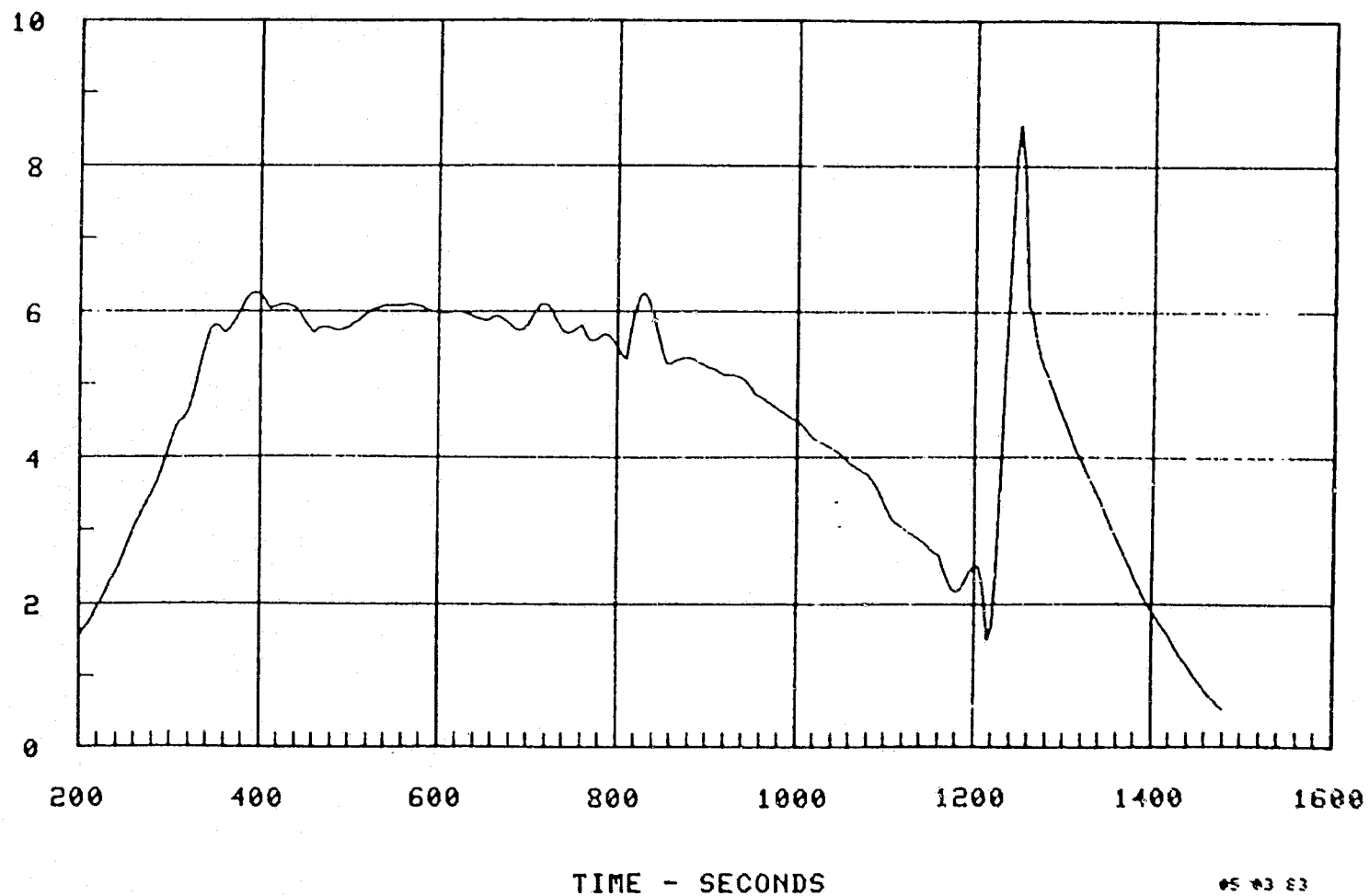
05 03 S3

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A

LOADING RATE -- B-TU/L-XXXX -- SEC

ORIGINAL
OF POOR QUALITY

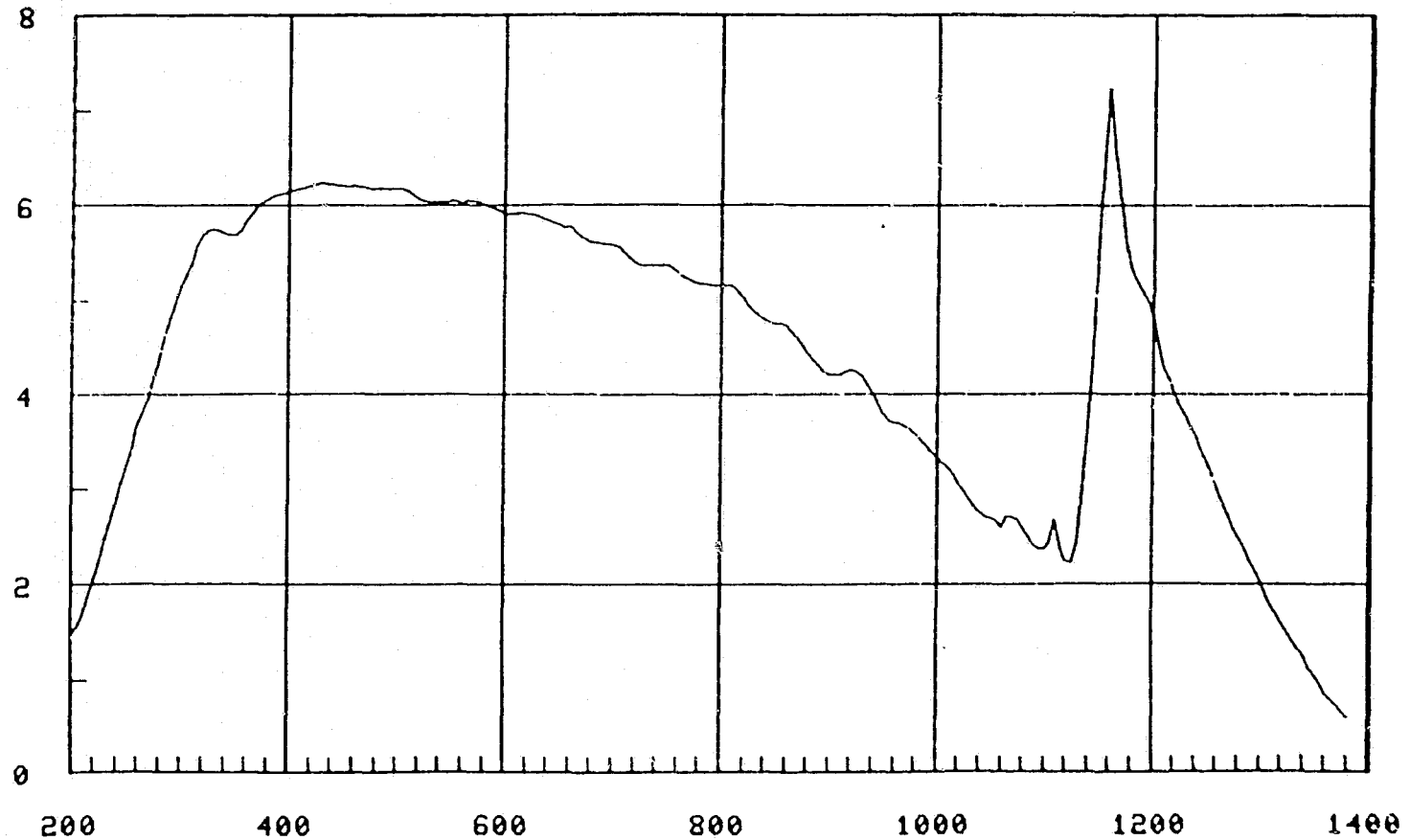


05 03 83

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A

HEATING RATE - BULB TEMPERATURE - SEC



TIME - SECONDS

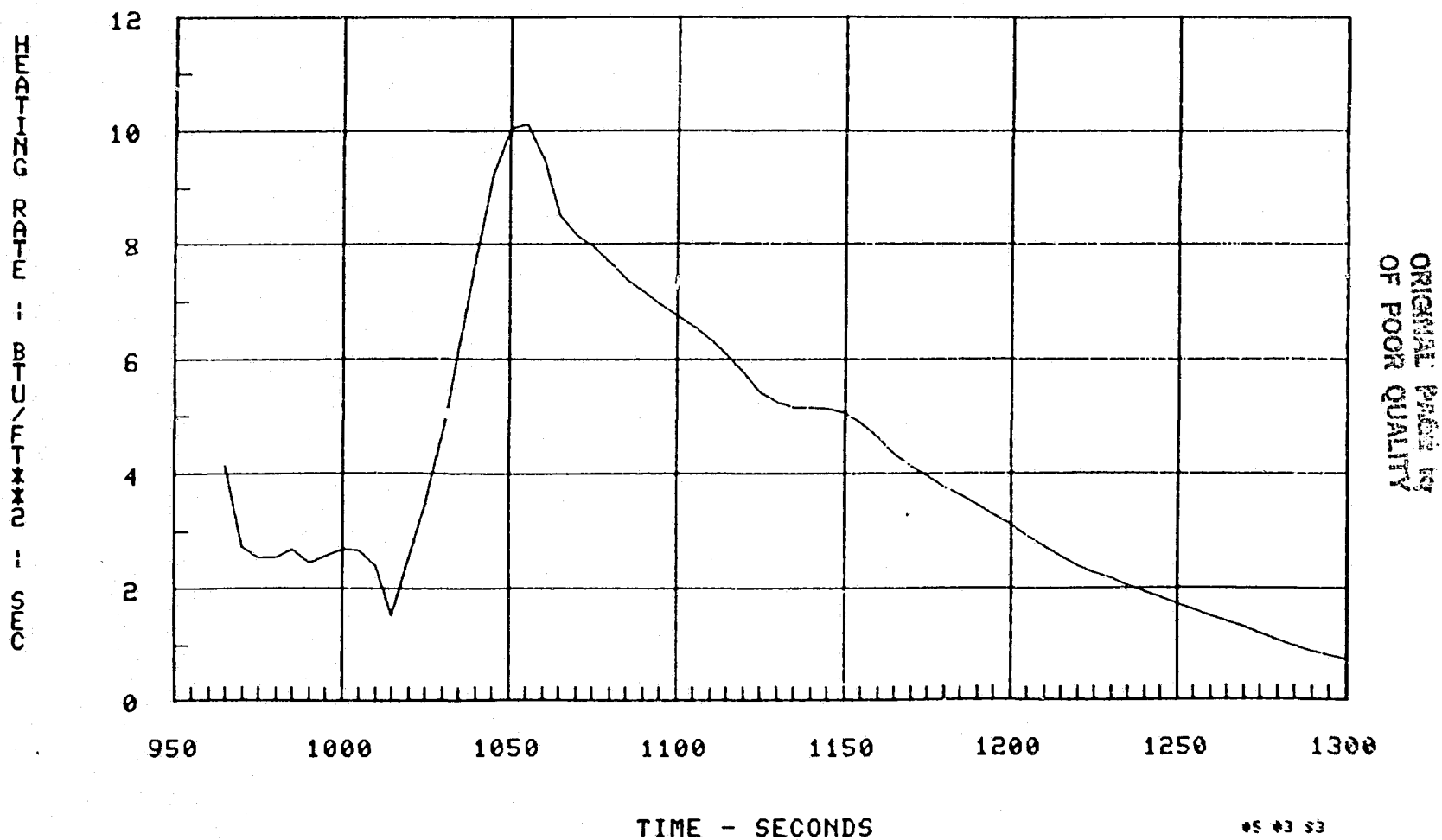
05 43 S3

ORIGINAL DATA TO
OF POOR QUALITY

8-168

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A



B-169

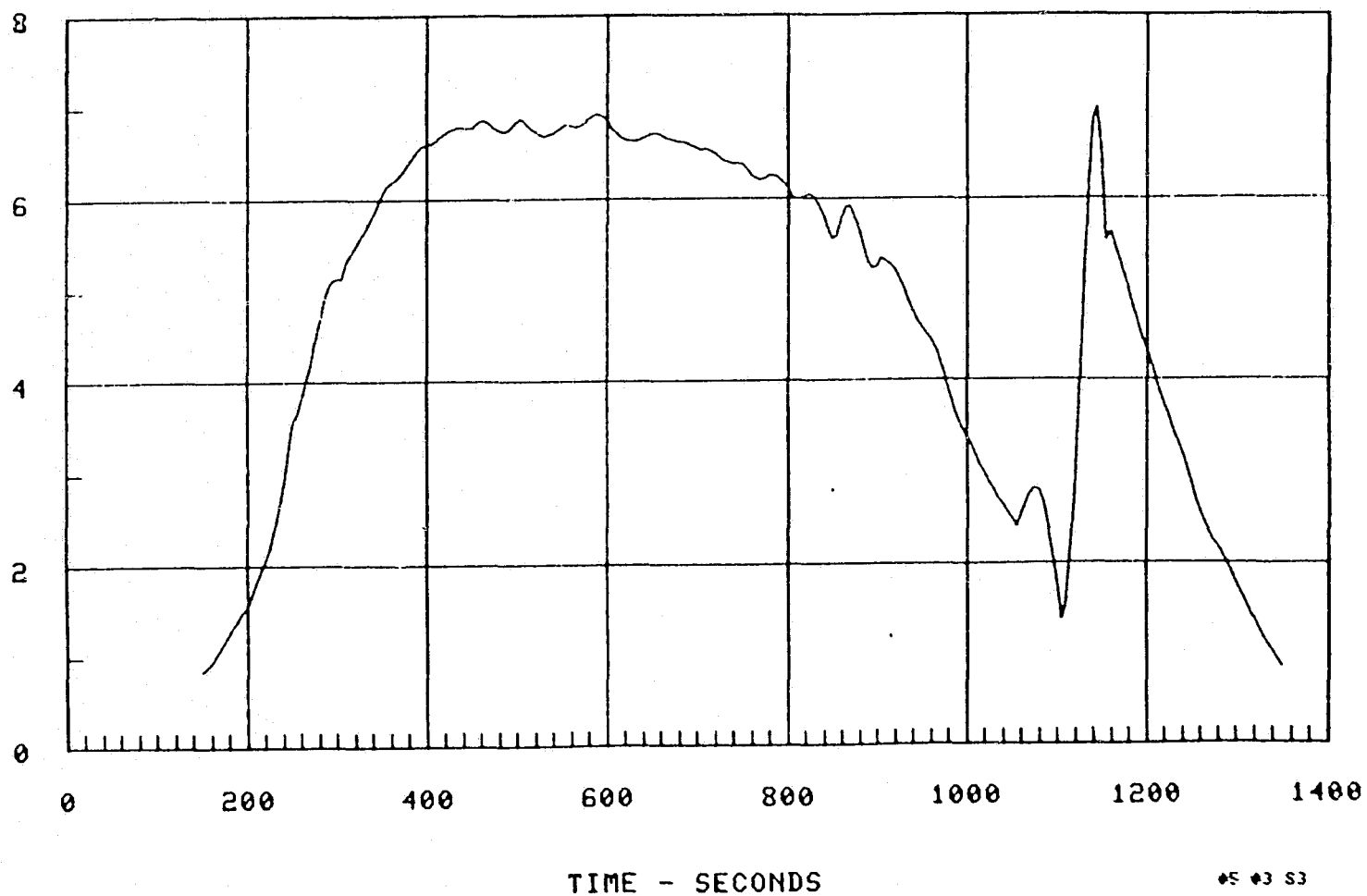
05 43 53

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A

HEATING RATE : BUTTERFLIES : SEC

B-170

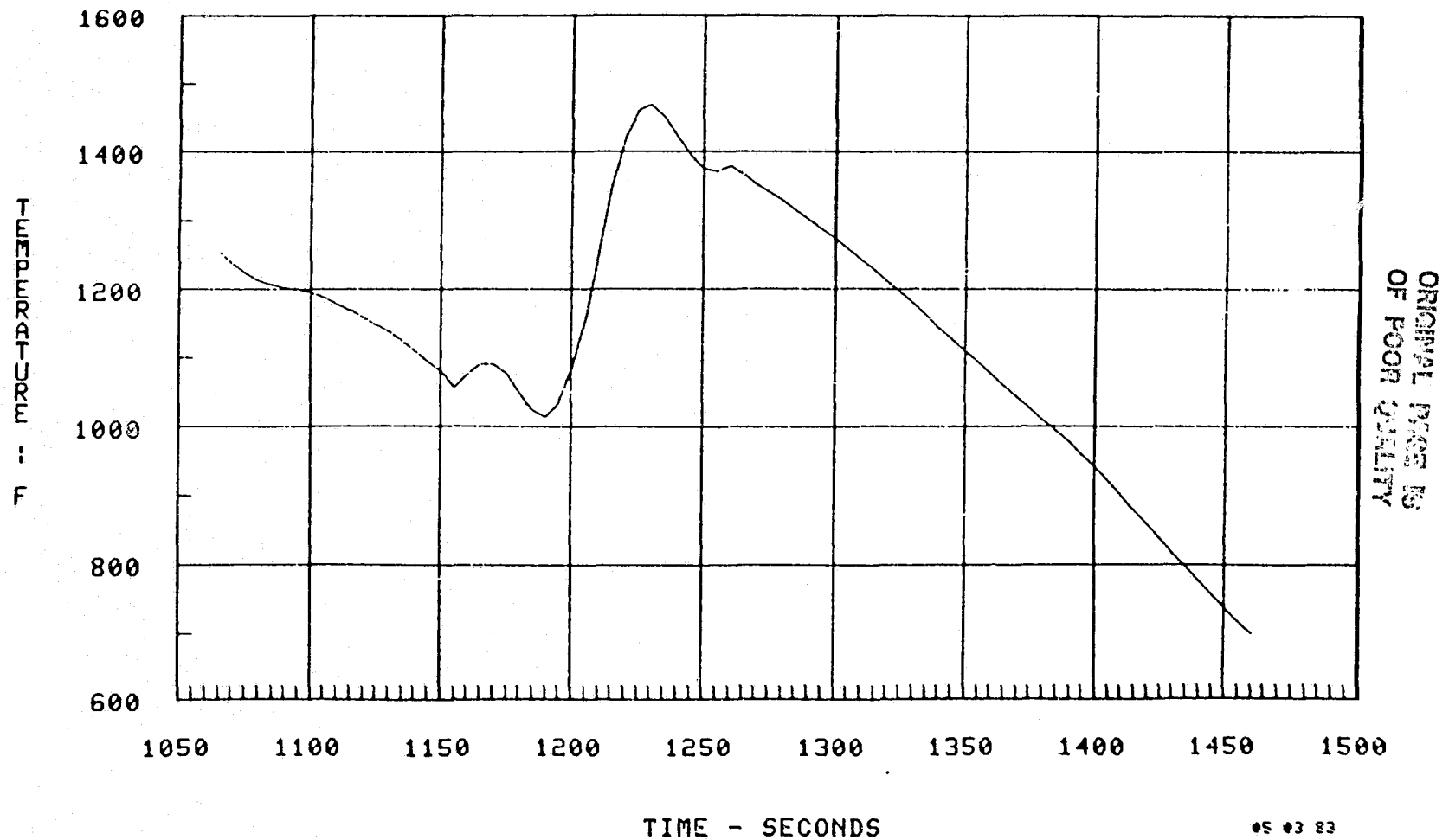


ORIGINAL FILED IN
OF POOR QUALITY

45 43 S3

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.64

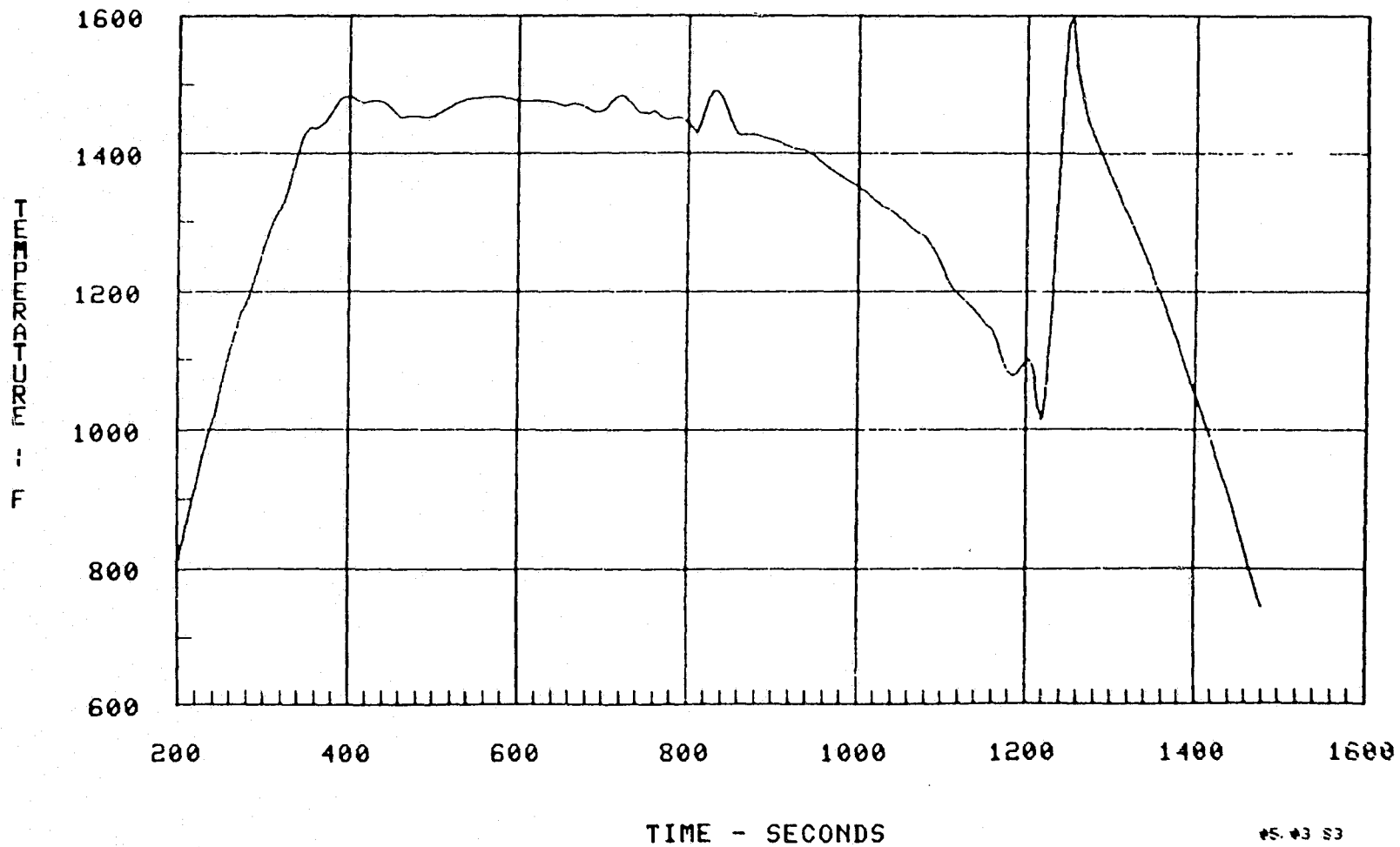
U09T9181A



B-171

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A

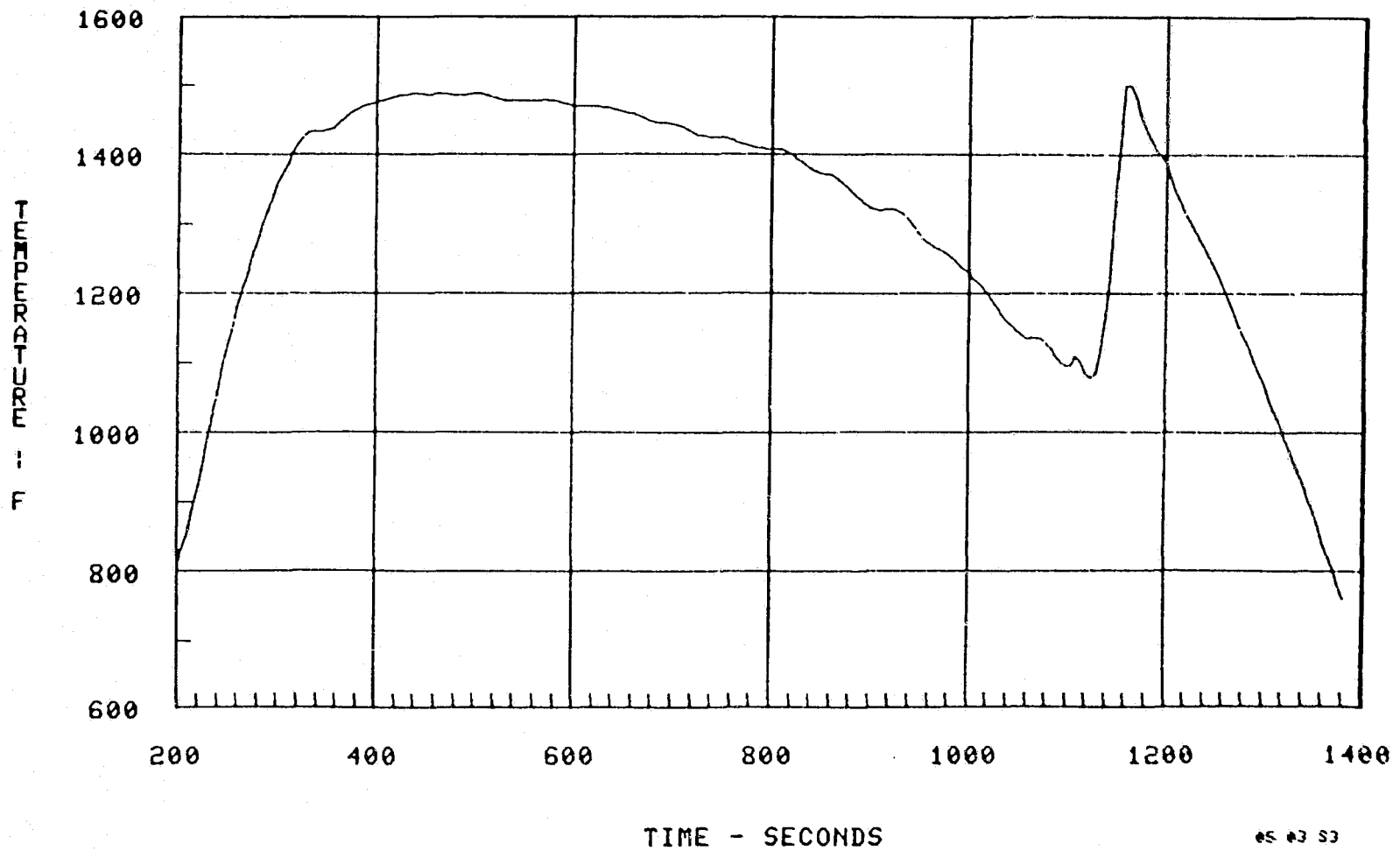


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OF POOR QUALITY

B-172

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.64$

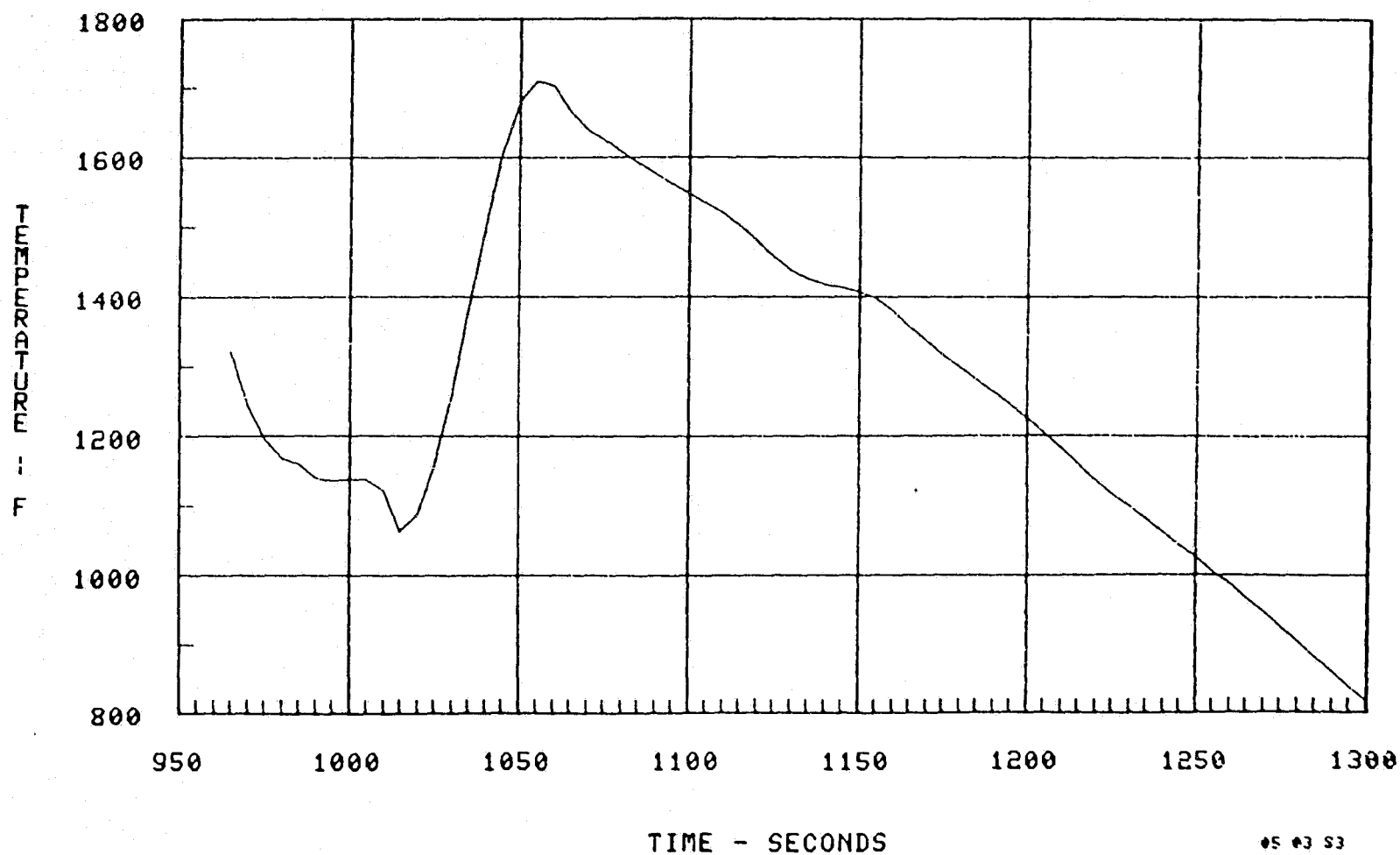
U09T9181A



B-173

STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.64$

U09T9181A



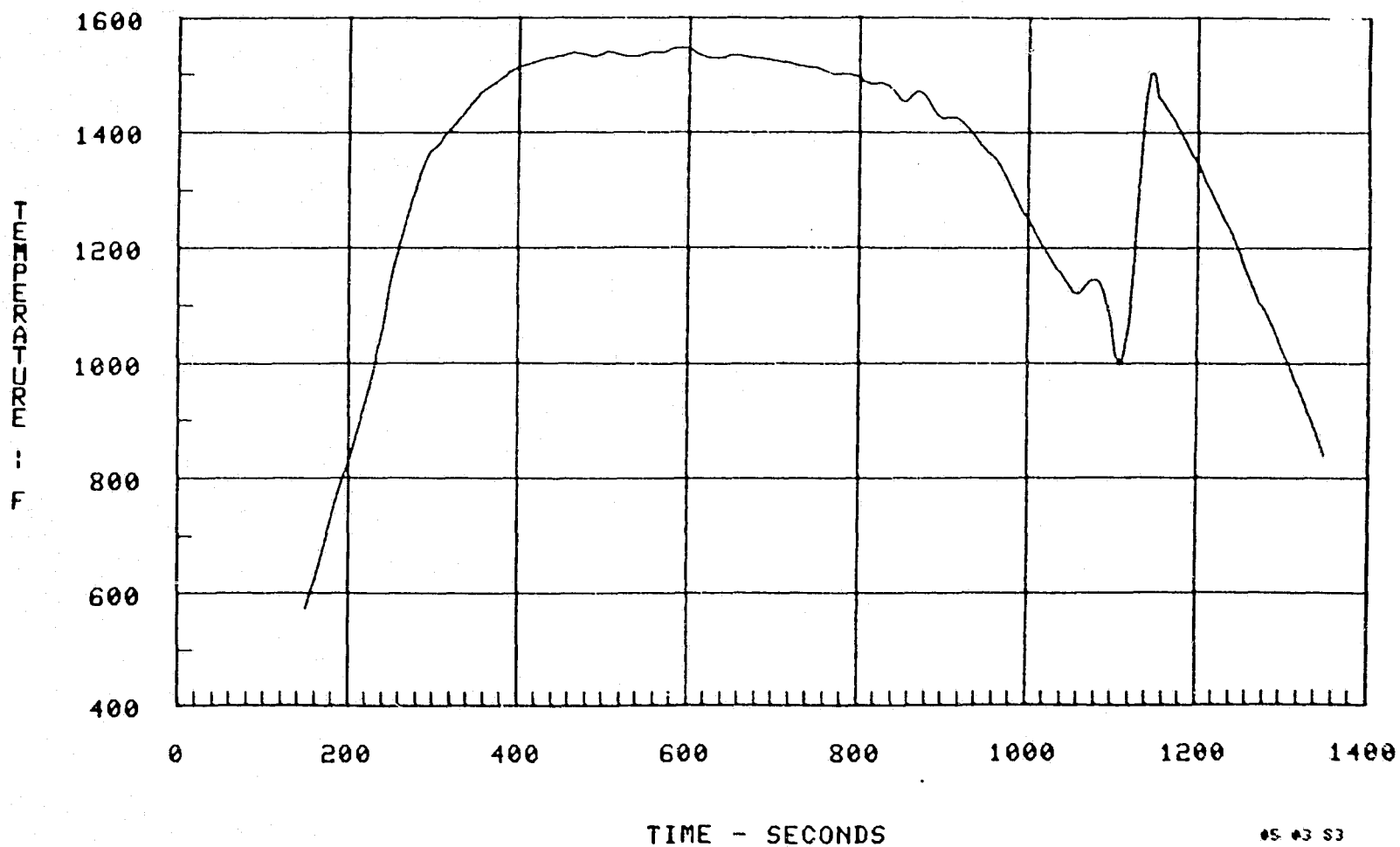
ORIGINAL PAGE IS
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B-174

05 03 53

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.64

U09T9181A



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OF POOR QUALITY

B-175

05 03 53

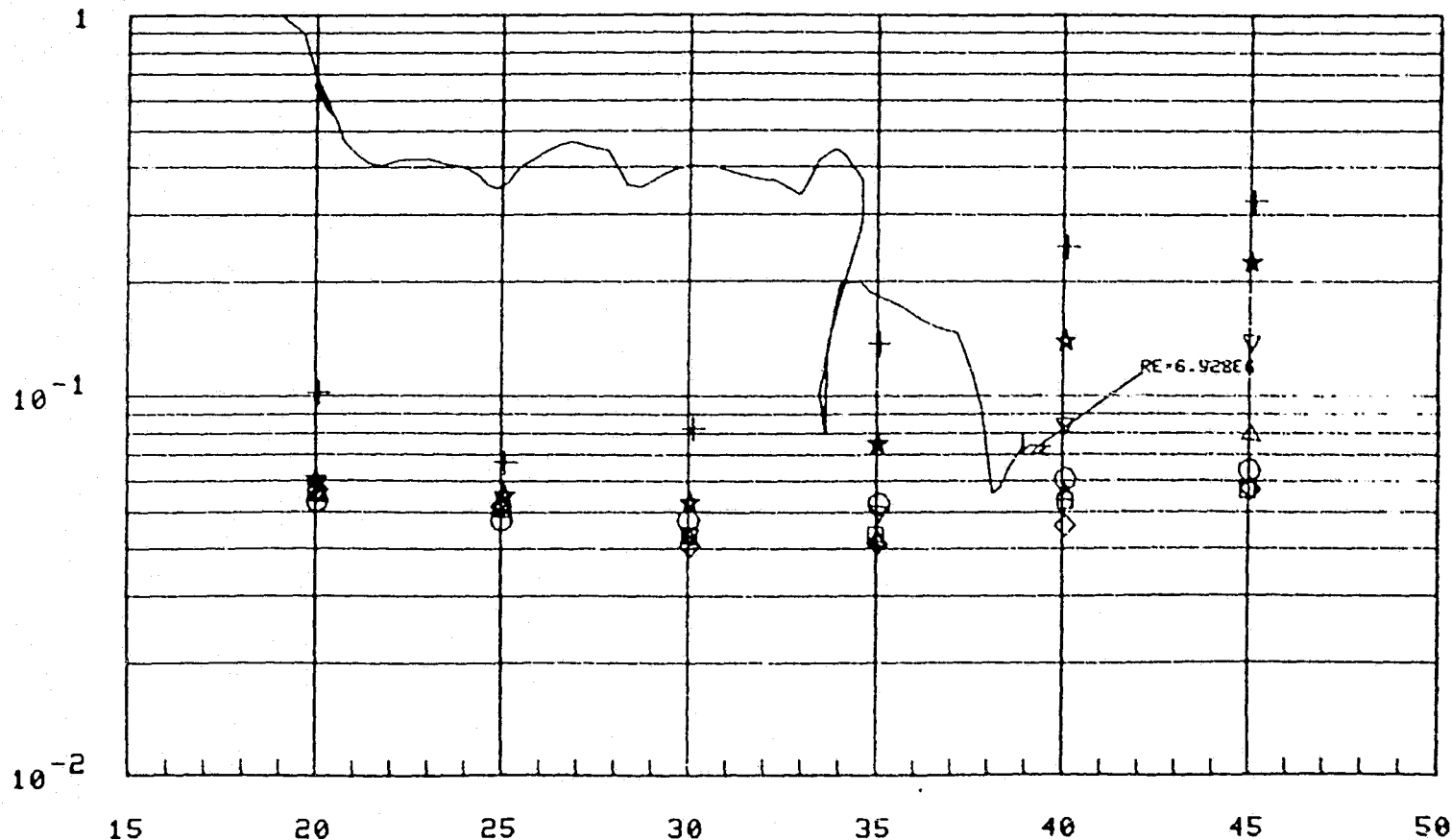
STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.68

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9674A/H-REF 1065-1460 SEC

FILE CODE: H/H-REF



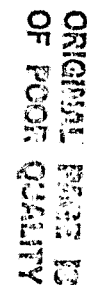
ORIGINAL COPY
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME * 09049744.000 SEC.

OH39	0.0175	SCALE	RE	0.5	E06
OH39	0.0175	SCALE	RE	1.0	E06
OH39	0.0175	SCALE	RE	1.5	E06
OH39	0.0175	SCALE	RE	2.0	E06
OH39	0.0175	SCALE	RE	2.5	E06
OH39	0.0175	SCALE	RE	3.0	E06
OH39	0.0175	SCALE	RE	3.7	E06

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B-177

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.68

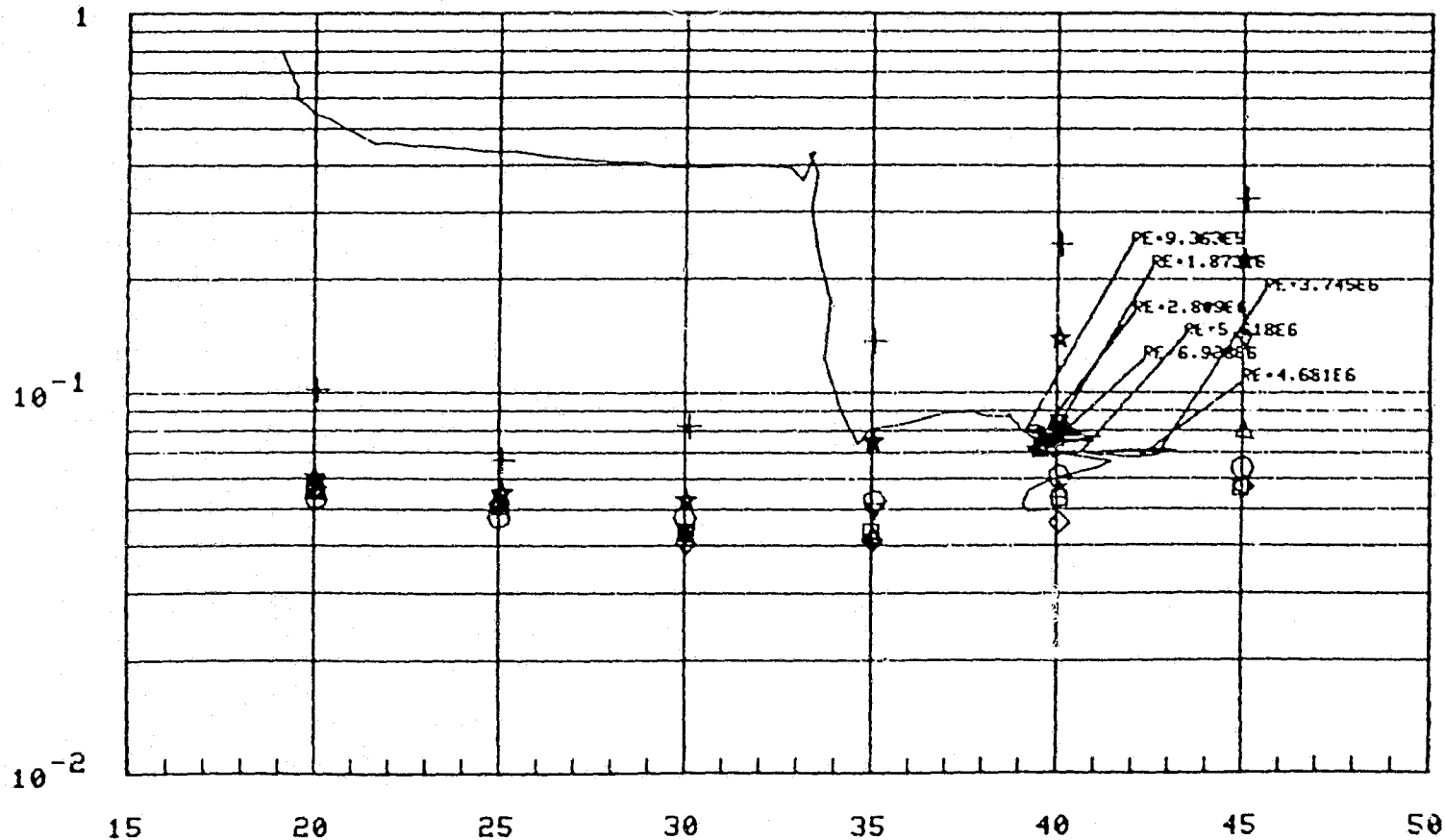
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9674A/H-REF 200-1380 SEC

LINE COULDN'T INTERPOLATE

B-178



ORIGINAL PLOT
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

BASE TIME = 0.7745654 SEC.

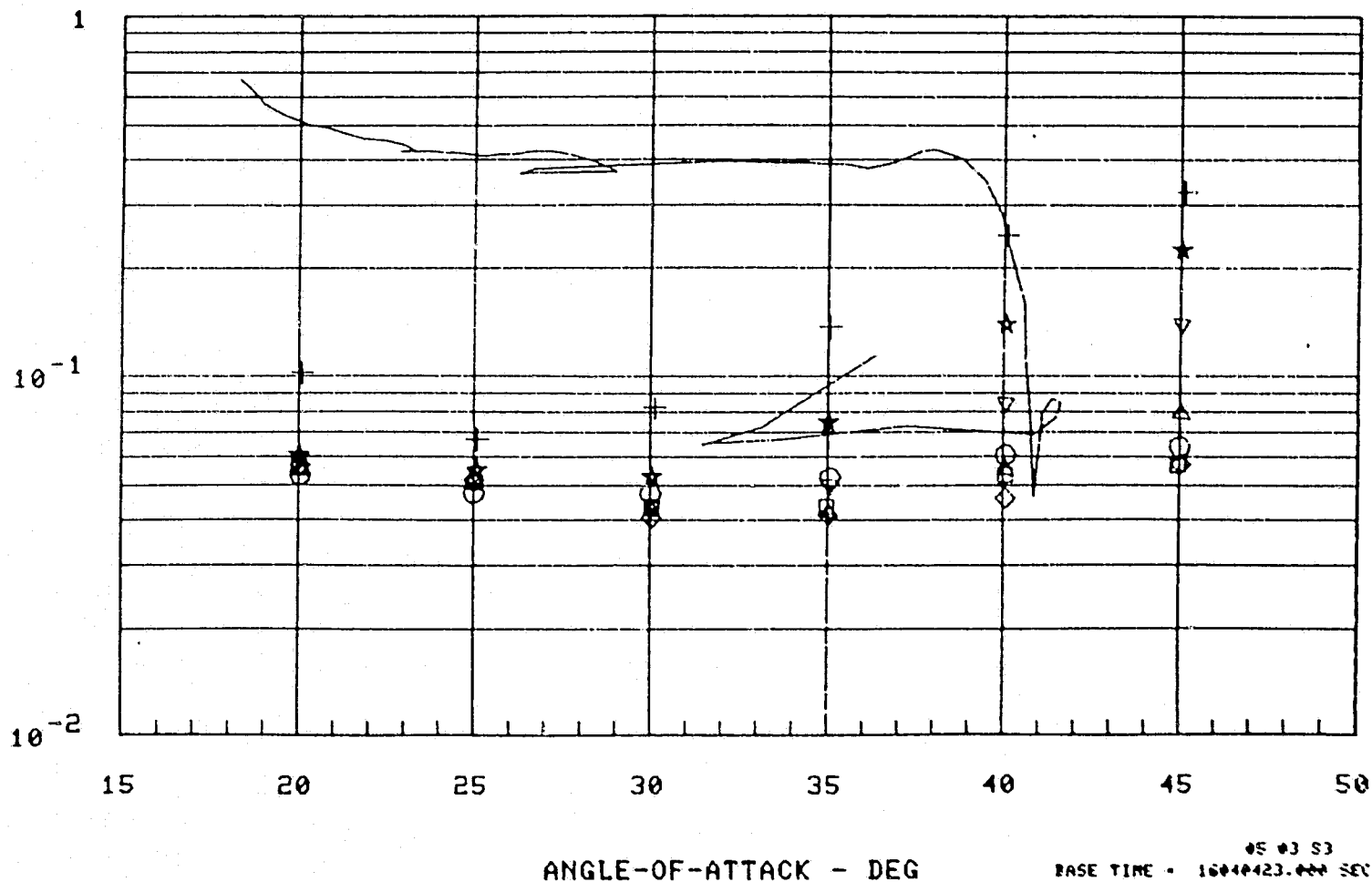
STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.68

○◇△★+

OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

V07T9674A/H-REF 965-1300 SEC

LINE CODES - H/H-REF



ORIGINAL PAGE IS
OF POOR
QUALITY

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.68

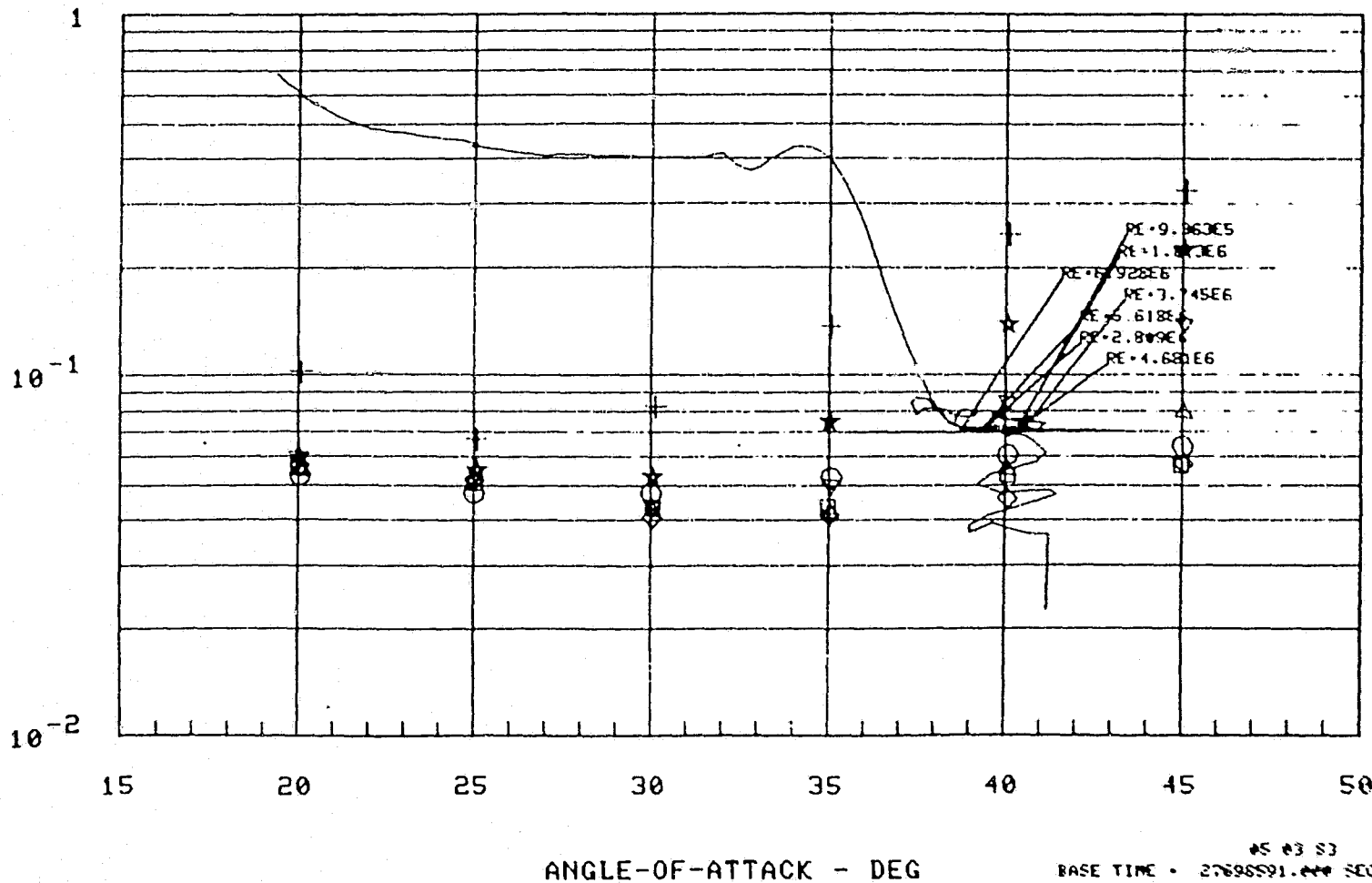
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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9674A/H-REF 150-1350 SEC

FILM COULDN'T BE REPRODUCED

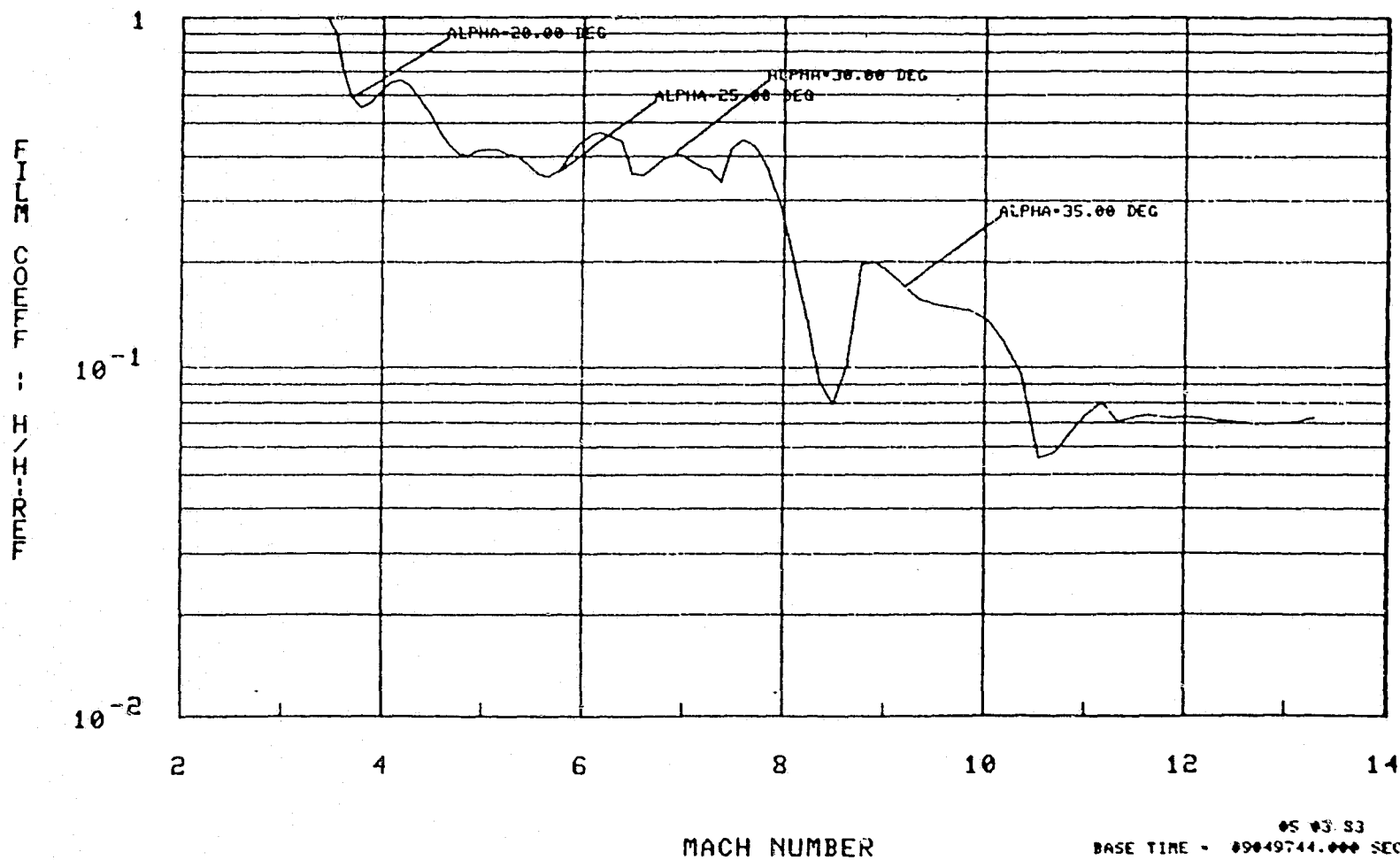
B-180



ORIGINAL PAGE IS
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STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

U07T9674A/H-REF 1065-1460 SEC

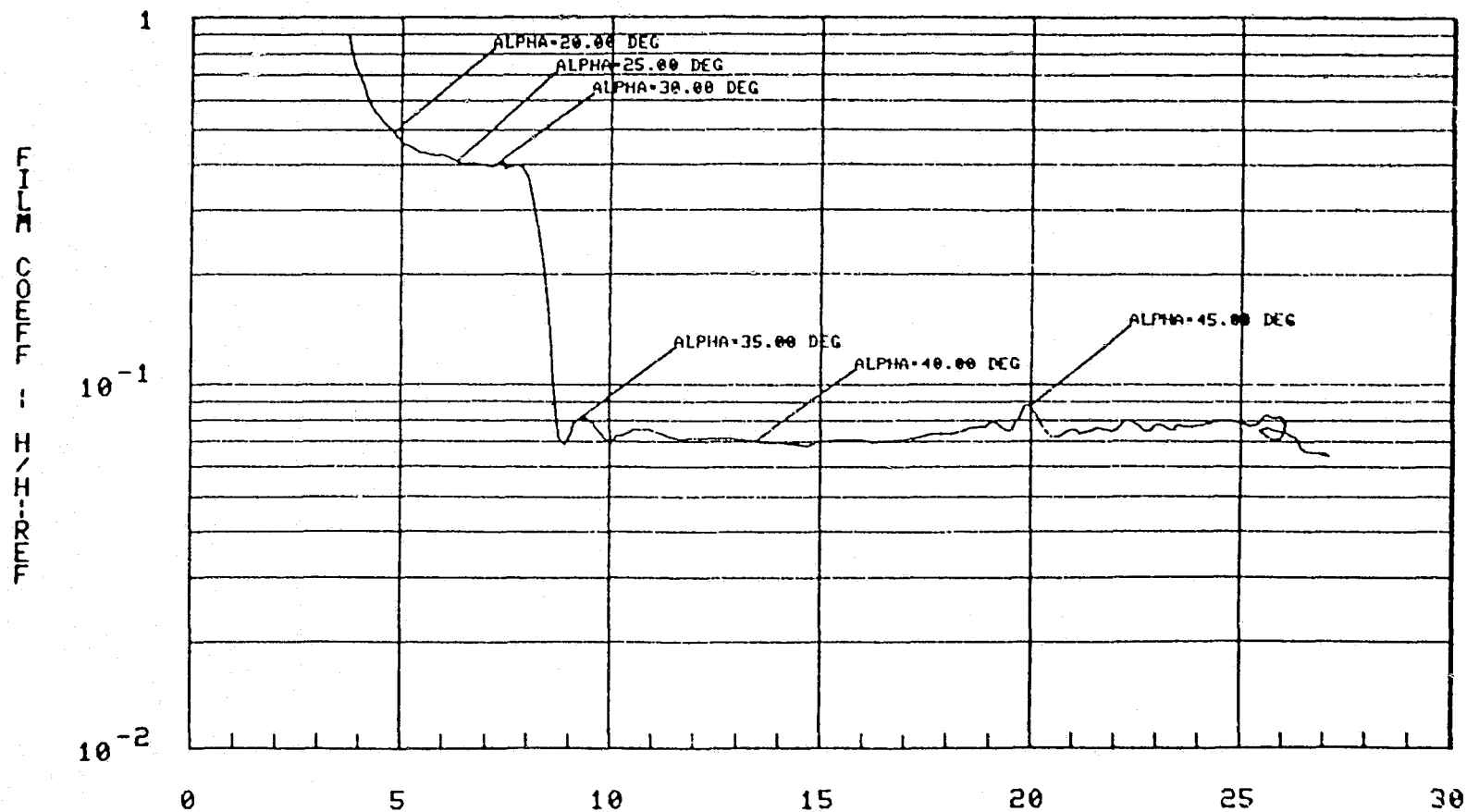


B-187

NOT FOR
QUALITY

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674A/H-REF 200-1480 SEC



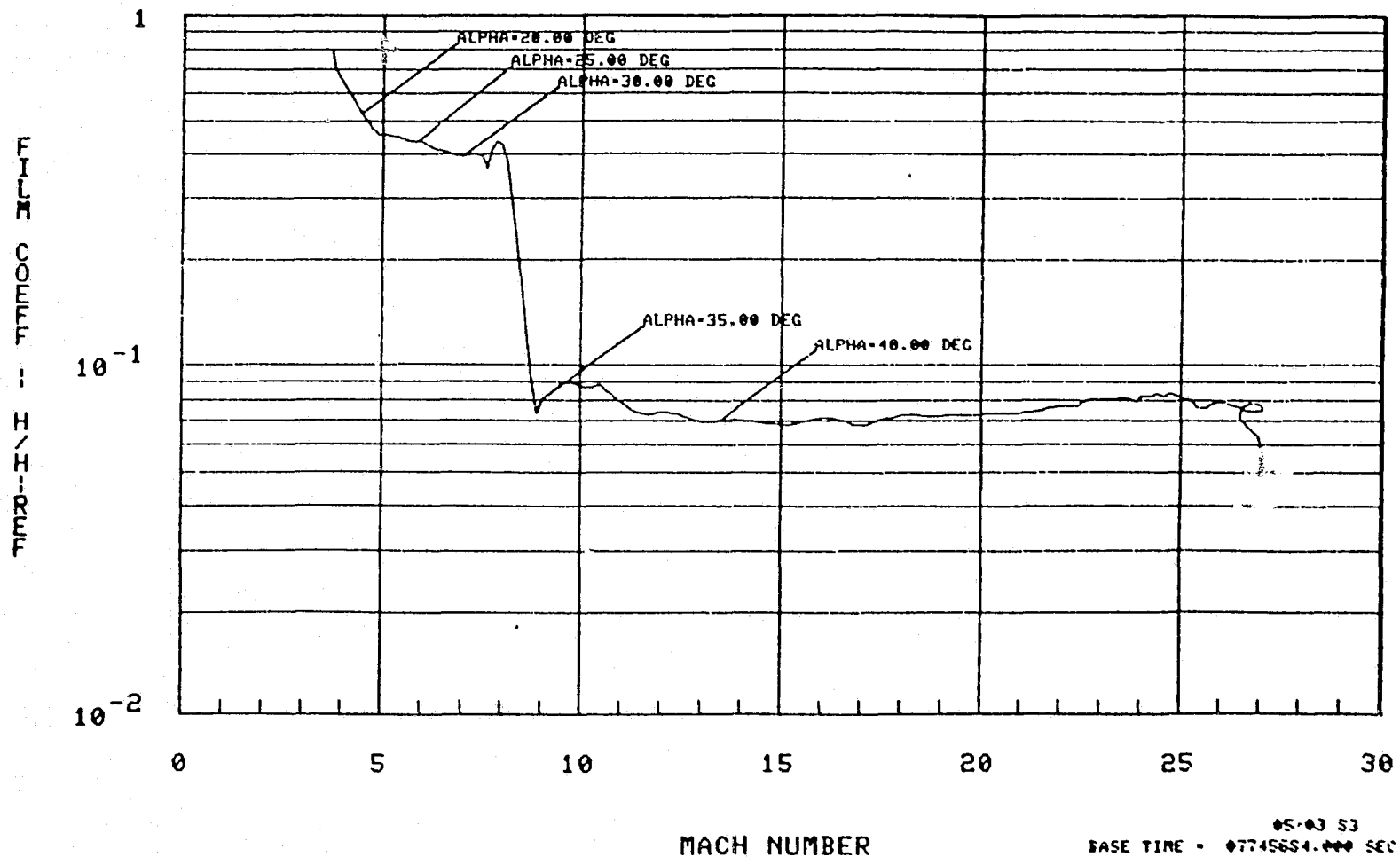
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OF POOR QUALITY

MACH NUMBER

BASE TIME = 27550236.000 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

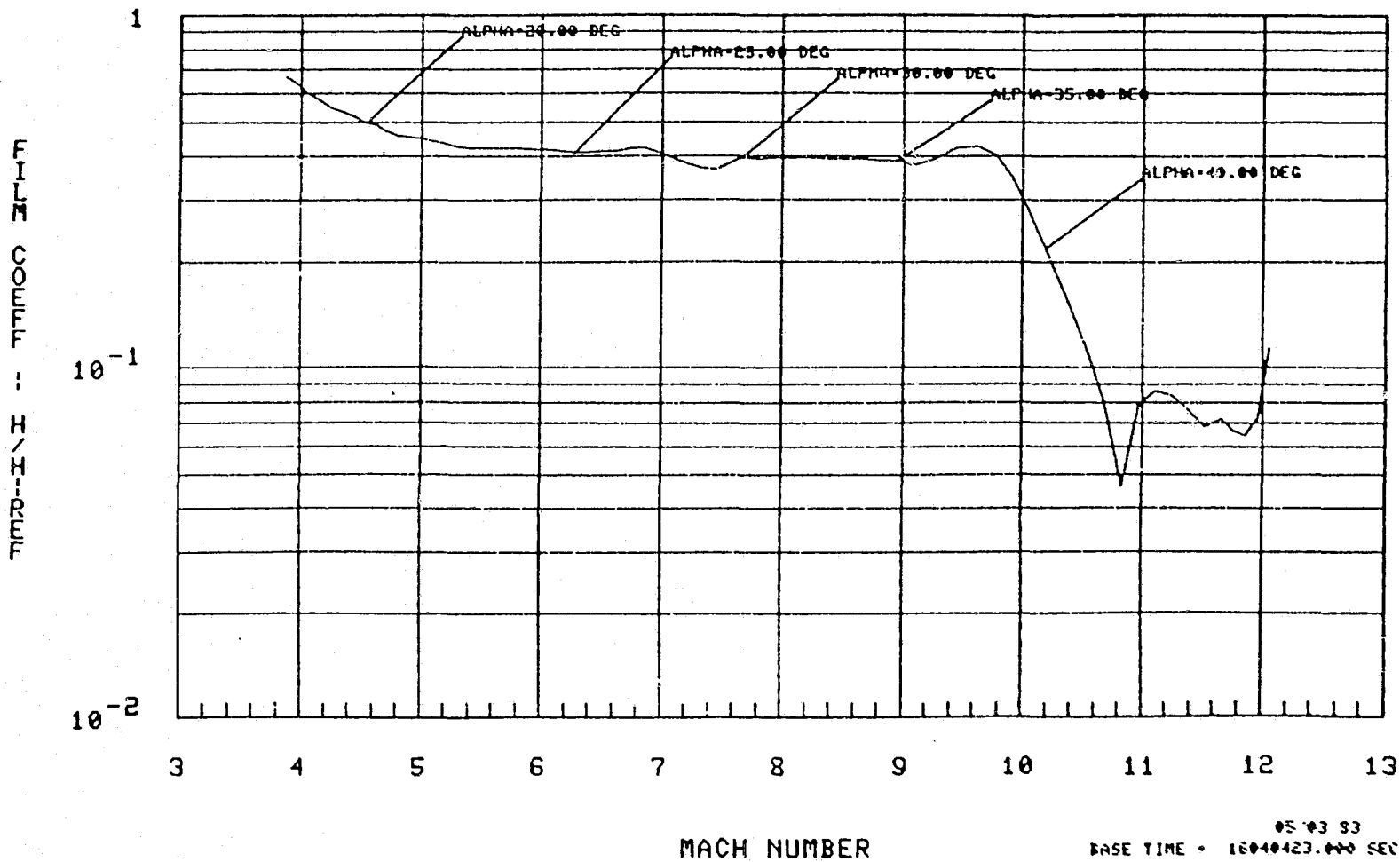
U07T9674A/H-REF 200-1380 SEC



B-183

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674R/H-REF 965-1300 SEC

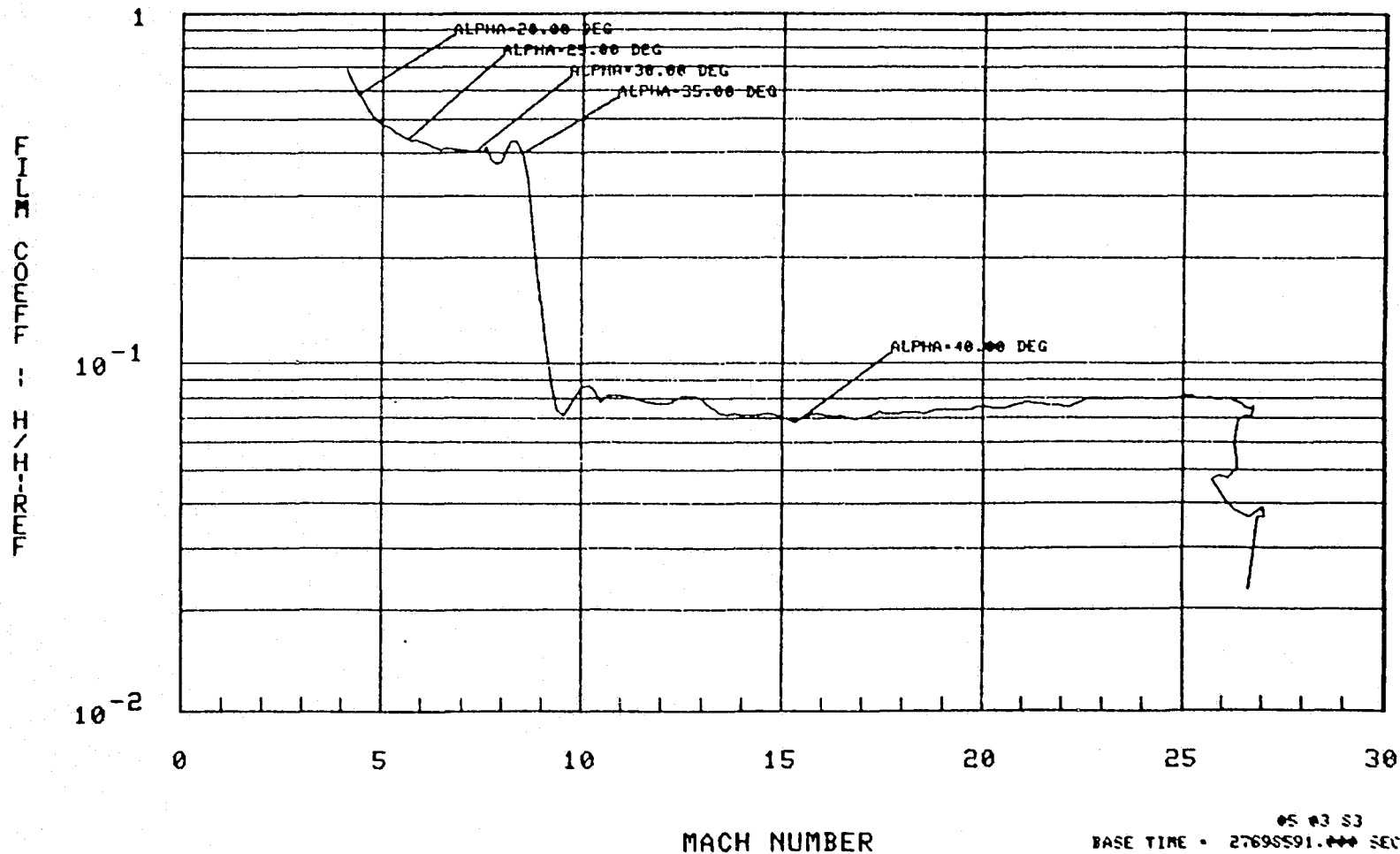


B-184

ORIGINAL PAGE IS
OF POOR QUALITY

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

U07T9674A/H-REF 150-1350 SEC



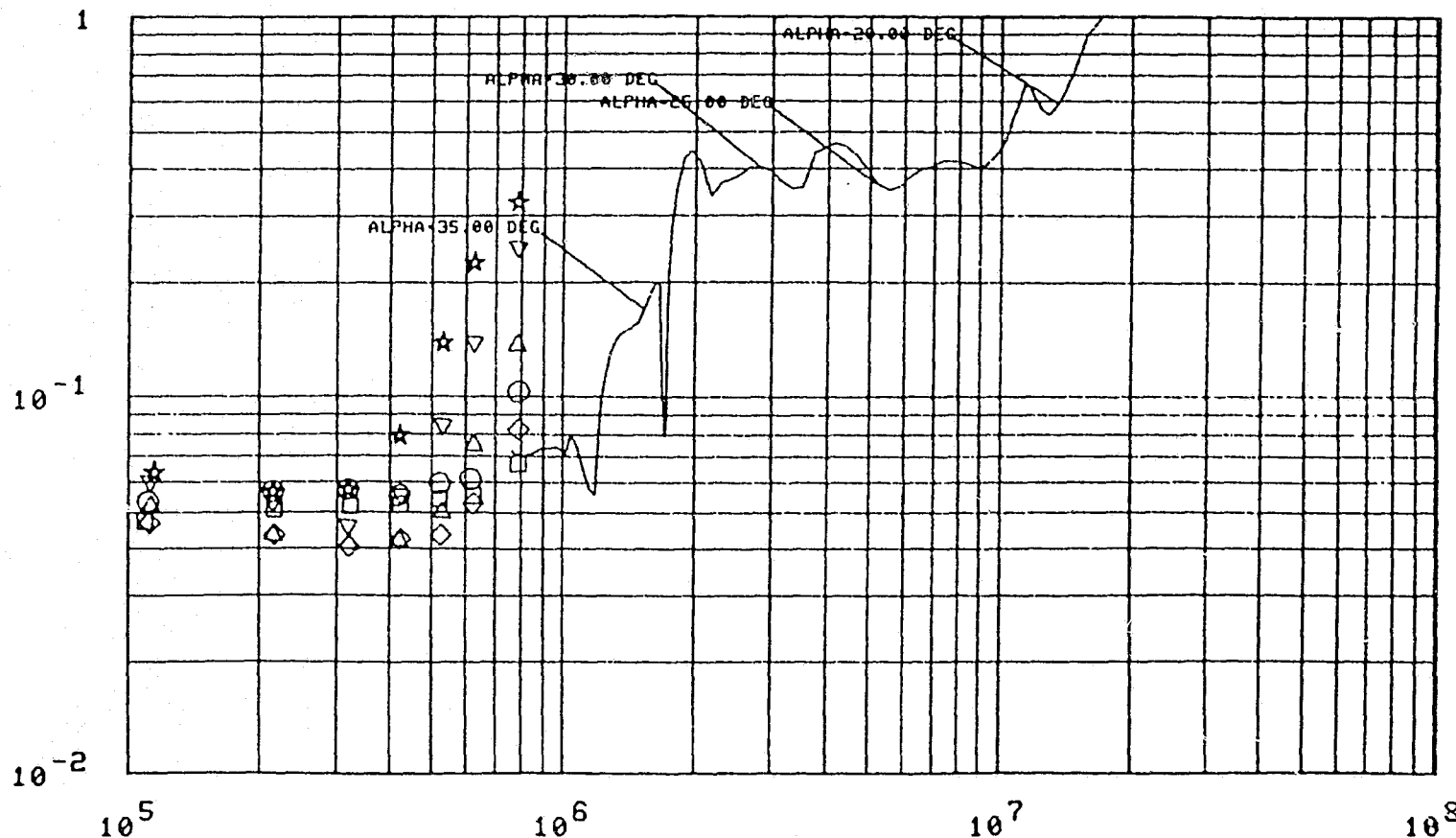
STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9674A/H-REF 1065-1460 SEC

LIFT COEFFICIENT - C_L



REYNOLDS NUMBER (NS)

05-03 93
BASE TIME - 09049744.000 SEC.

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OF POOR QUALITY

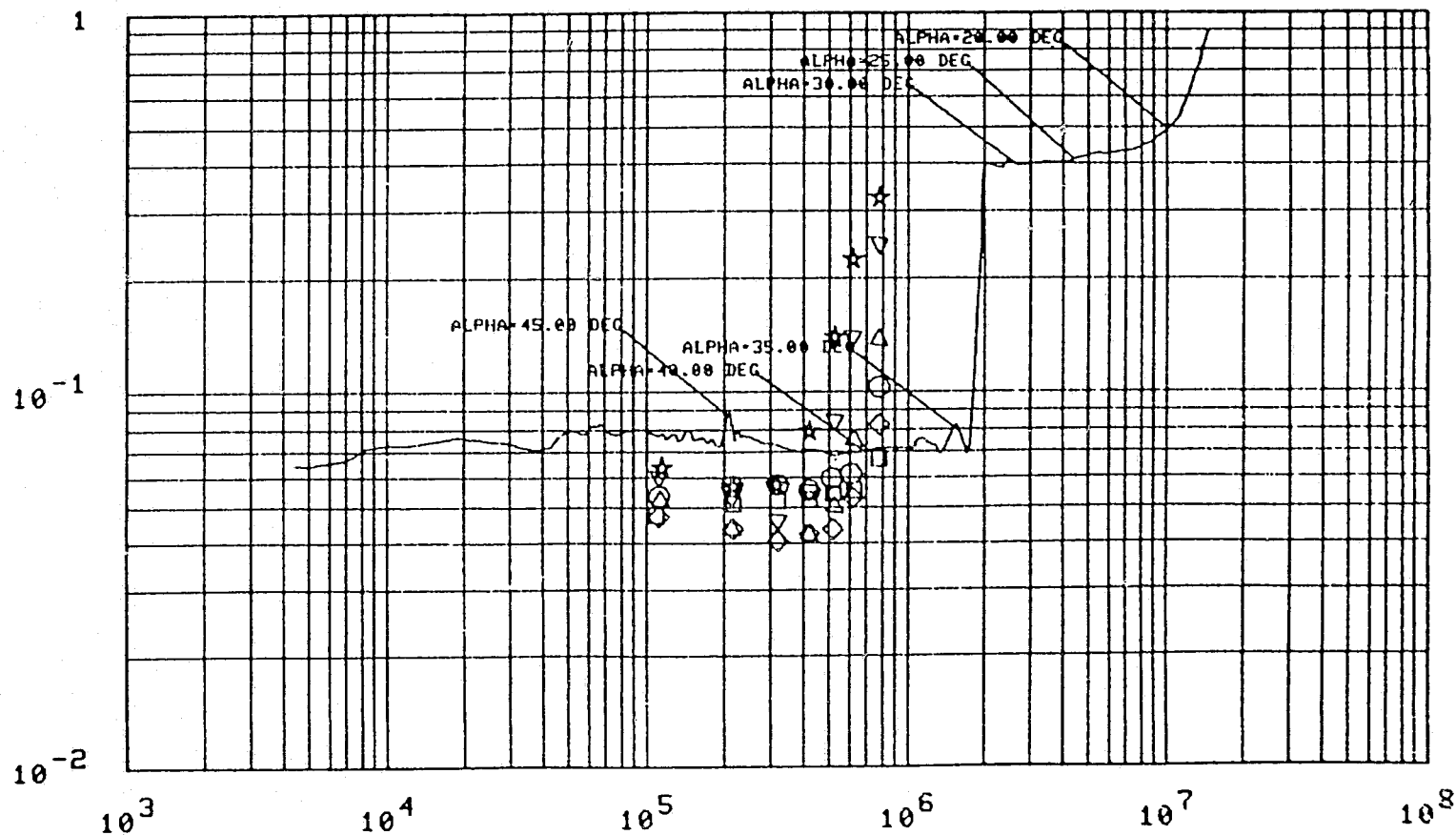
STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9674A/H-REF 200-1480 SEC

LINE COULDN'T INTERPOL



ORIGINAL PLOT IS
OF POOR QUALITY

B-187

REYNOLDS NUMBER (NS)

BASE TIME • 27550236.000 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.68

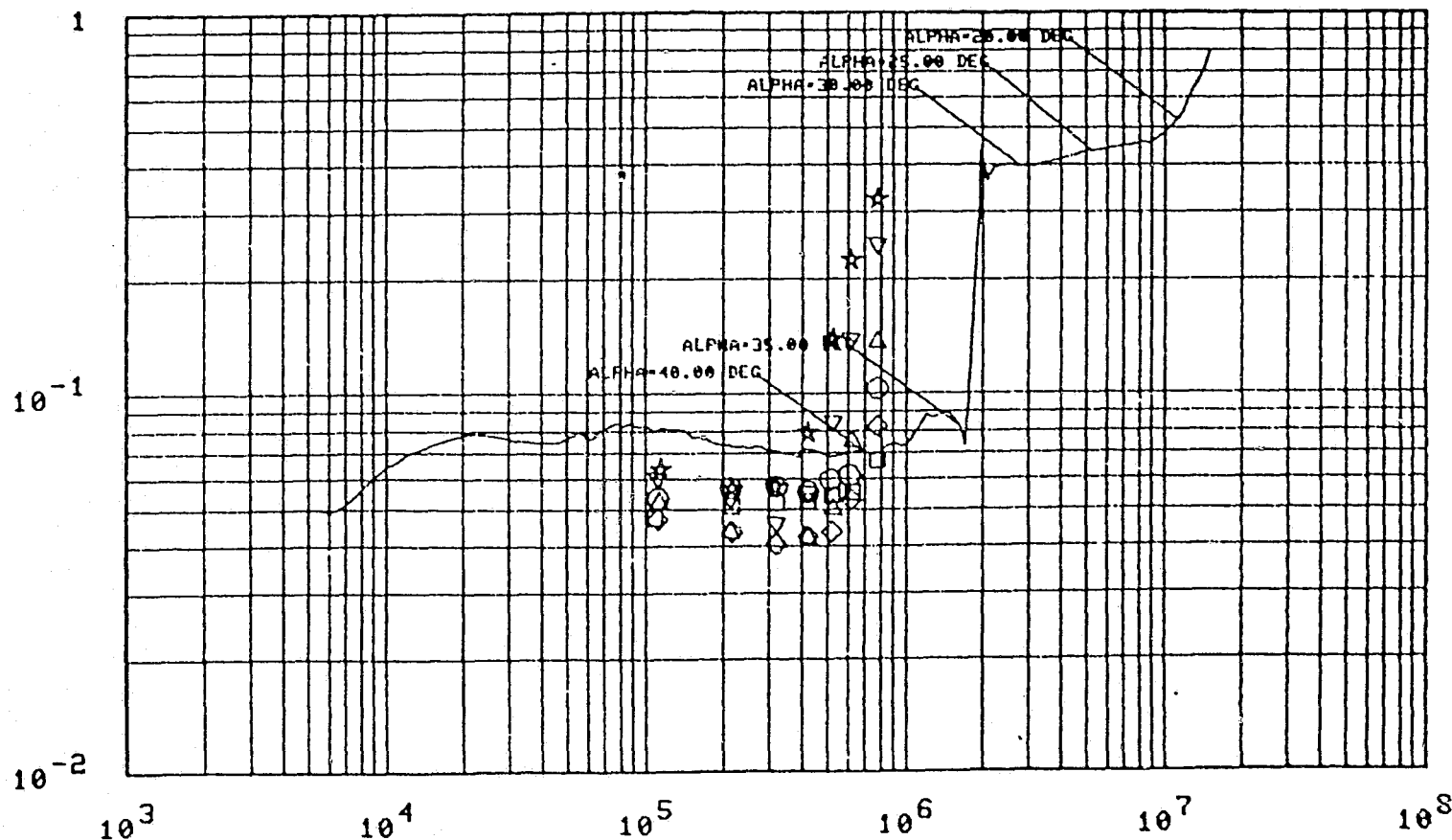
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9674A/H-REF 200-1380 SEC

LINE CODES : H/H-GRU

B-188



ORIGINAL DRAWING
OF POOR QUALITY

REYNOLDS NUMBER (NS)

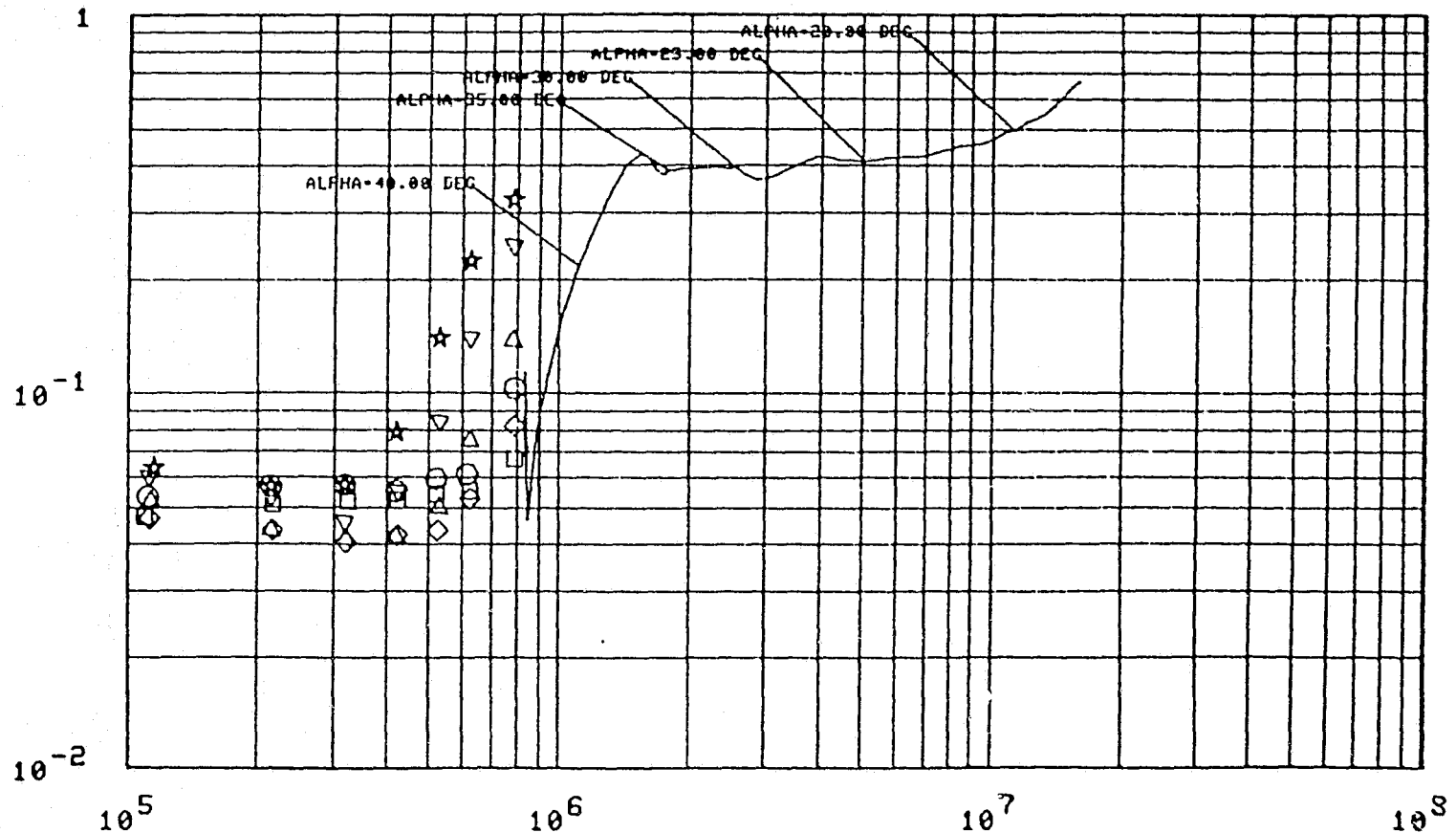
MS 03 S3
BASE TIME = 077456S4.000 SEC.

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.68

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9674A/H-REF 965-1300 SEC



WING COEFF - H/H-REF

ORIGINAL PAGE IS
OF POOR QUALITY

B-185

REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

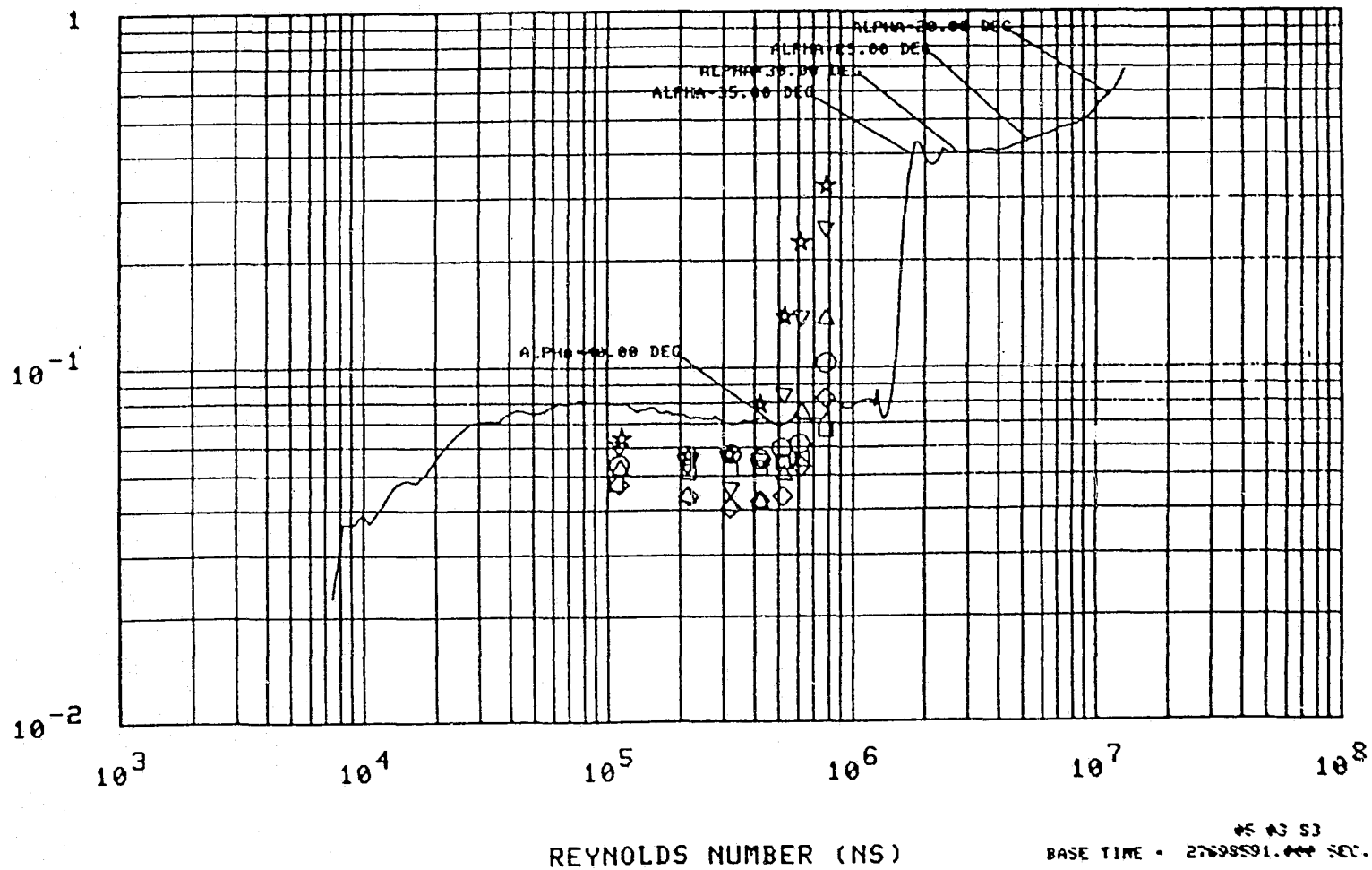
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U67T9674A/H-REF 150-1350 SEC

LINE CODE: H-H-REF

B-190

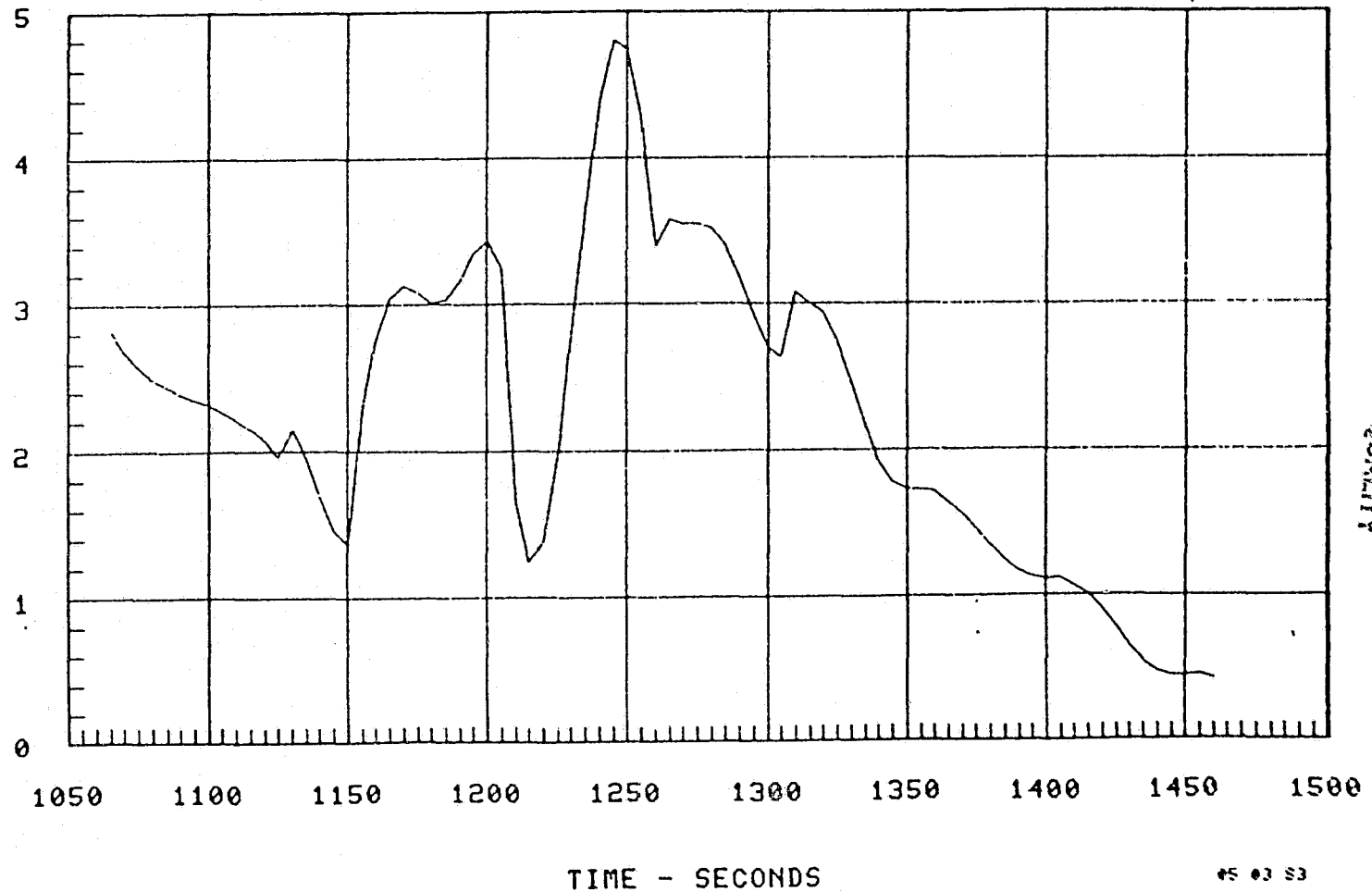


STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U0719E74A

INTERIM REPORT -- BUILDING -- SEC

B-191



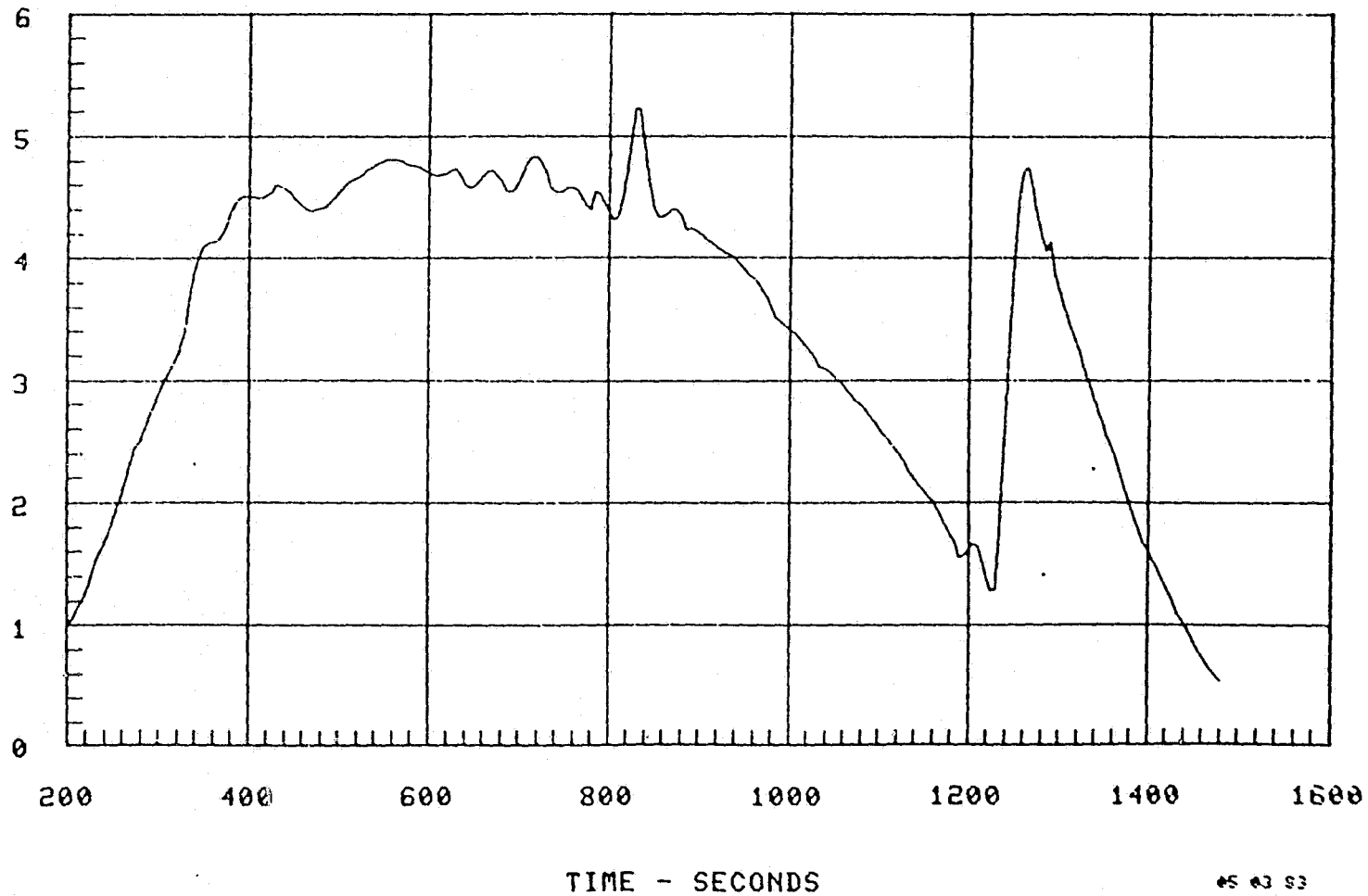
ORIGINAL PRICE IS
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45 03 53

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674A

HEATING RATE - BULB TEMPERATURE - SEC



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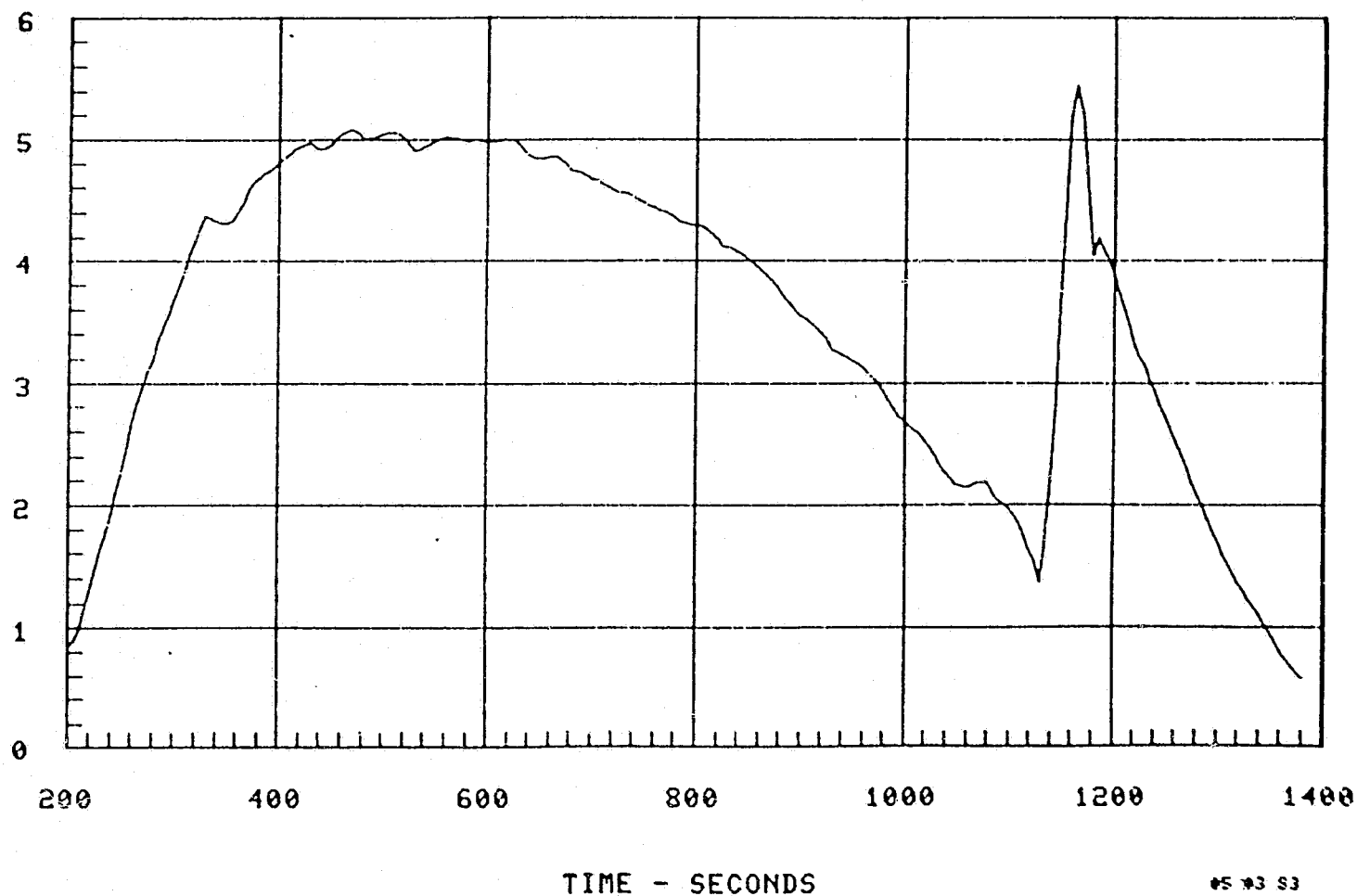
B-192

45 43 53

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674A

HEATING RATE - BULBEMMS - SEC



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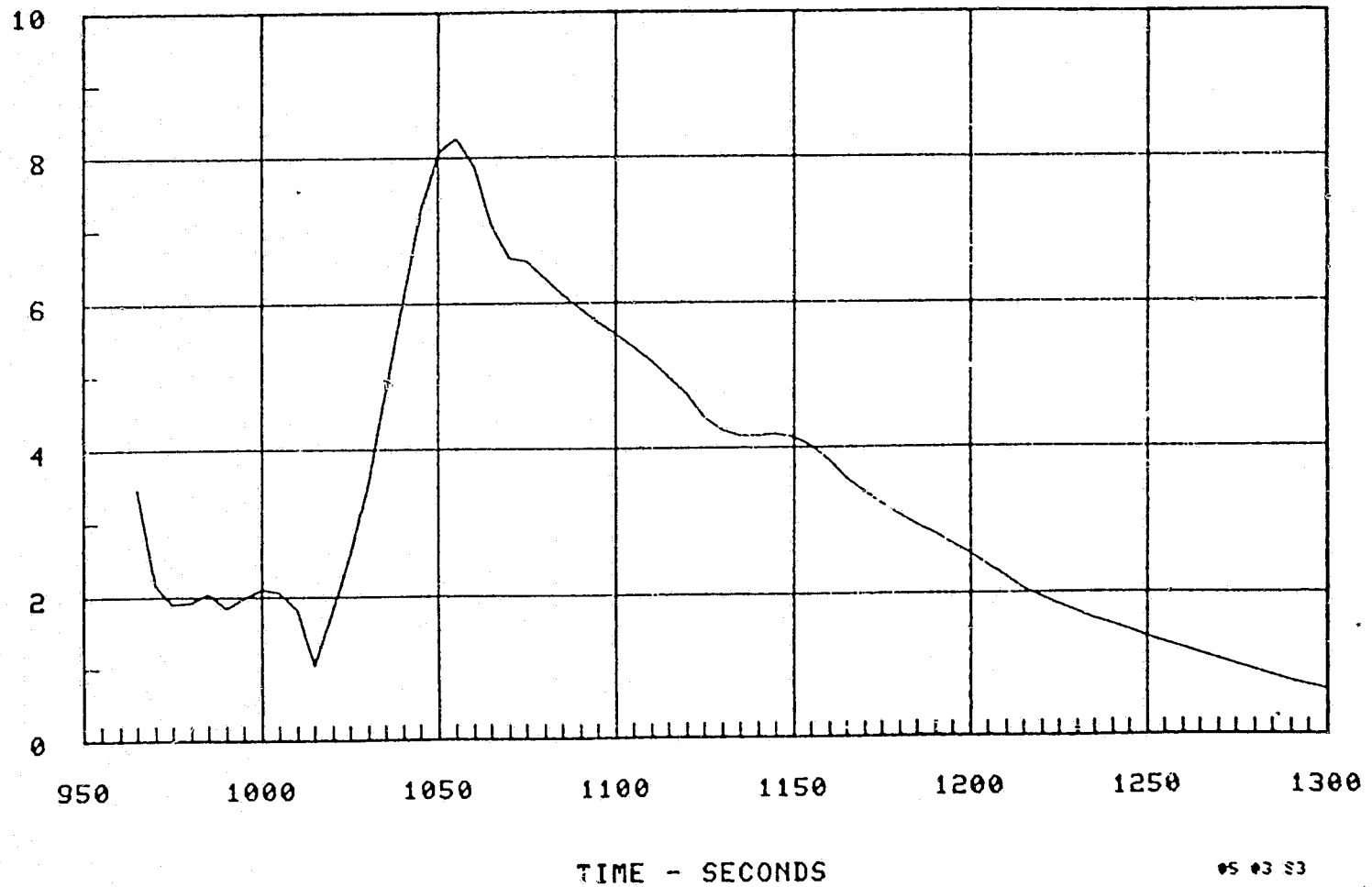
B-193

#5 #3 S3

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674A

FEEDING RATE : BULLETS : SEC



05 03 53

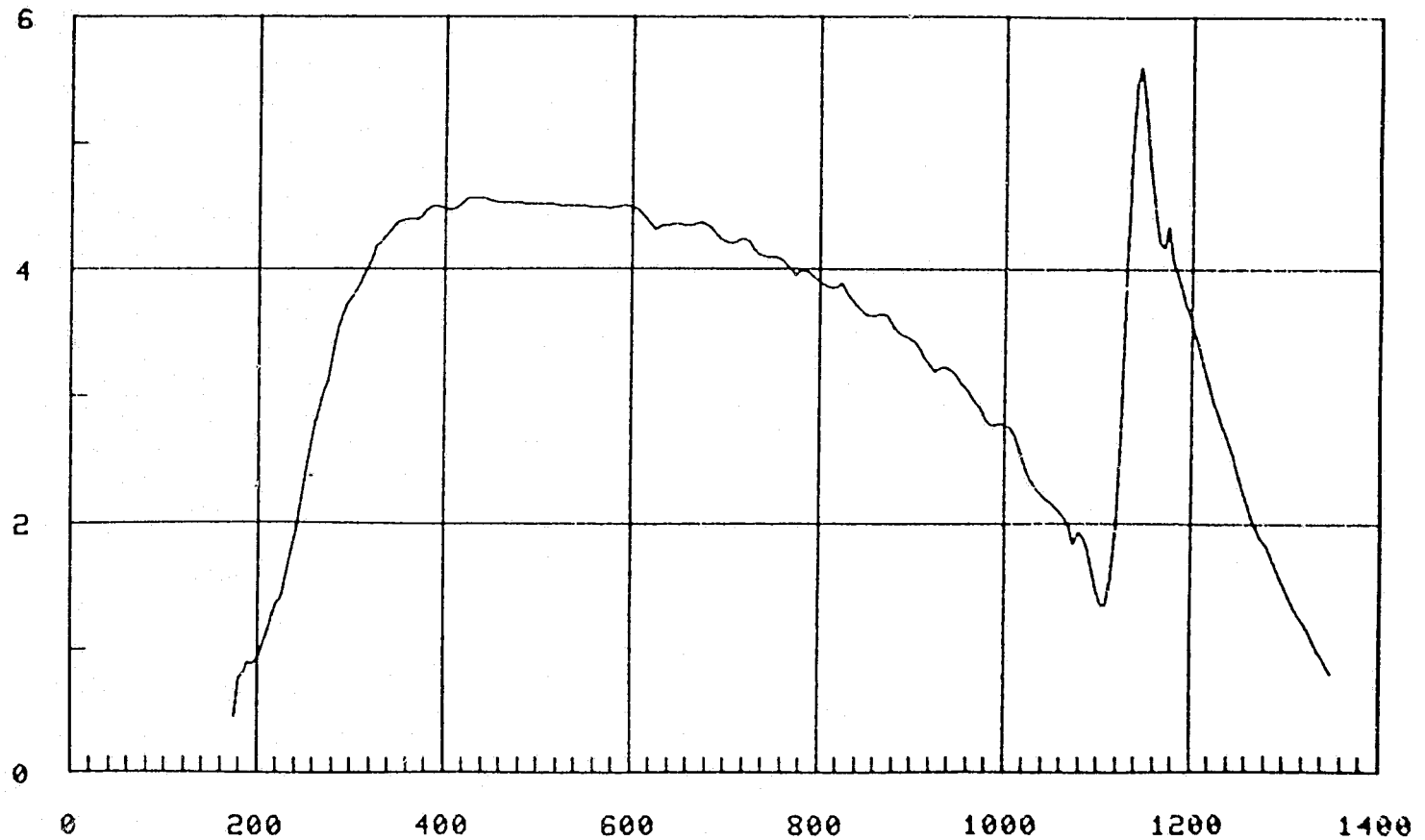
ORIGINAL PAGE 13
OF POOR QUALITY

B-194

STS-5 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

U07T9674A

HEATING RATE - BTU/FT² - SEC



TIME - SECONDS

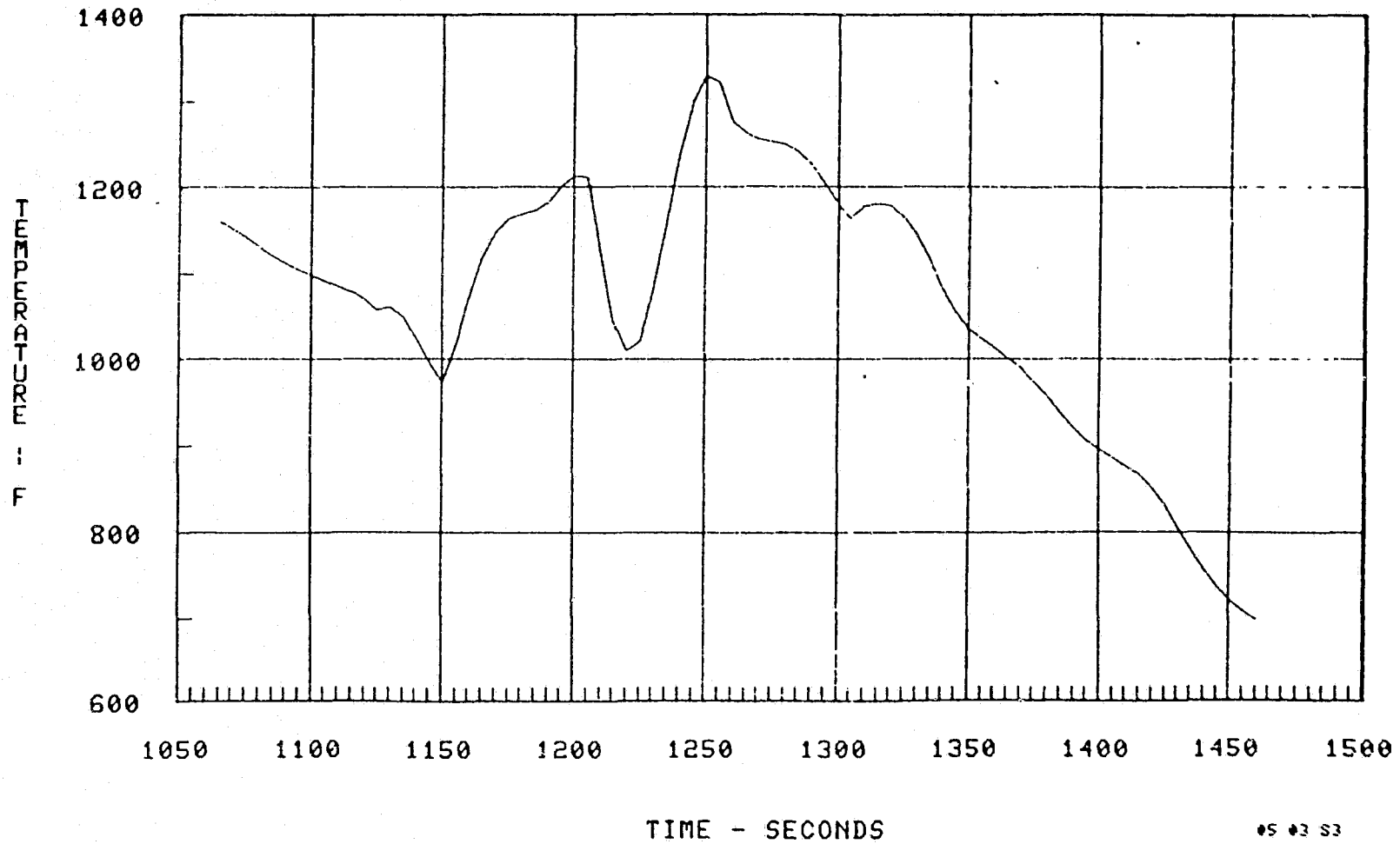
05-43 S3

ORIGINAL PAGE IS
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B-195

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674A

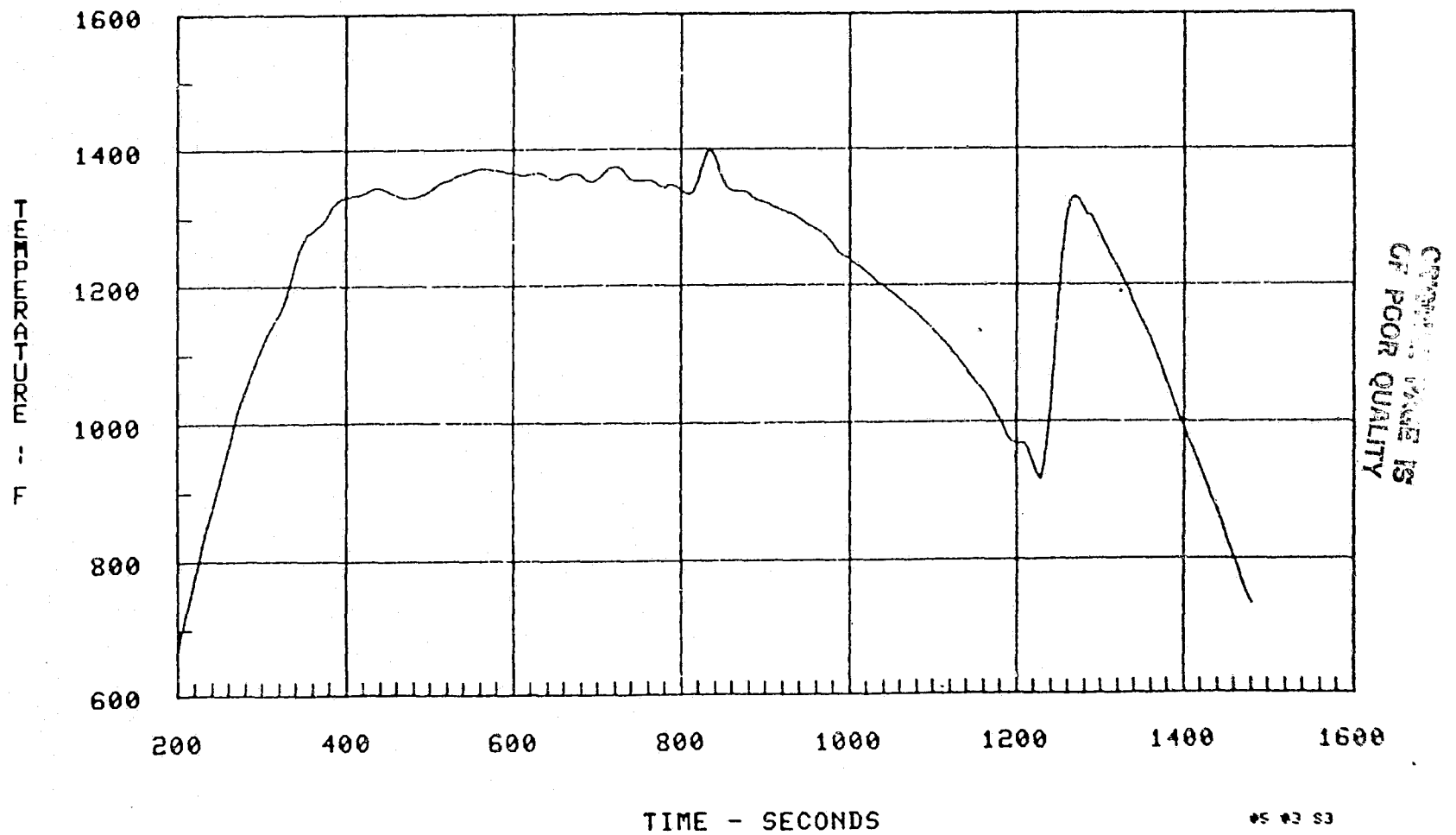


B-196

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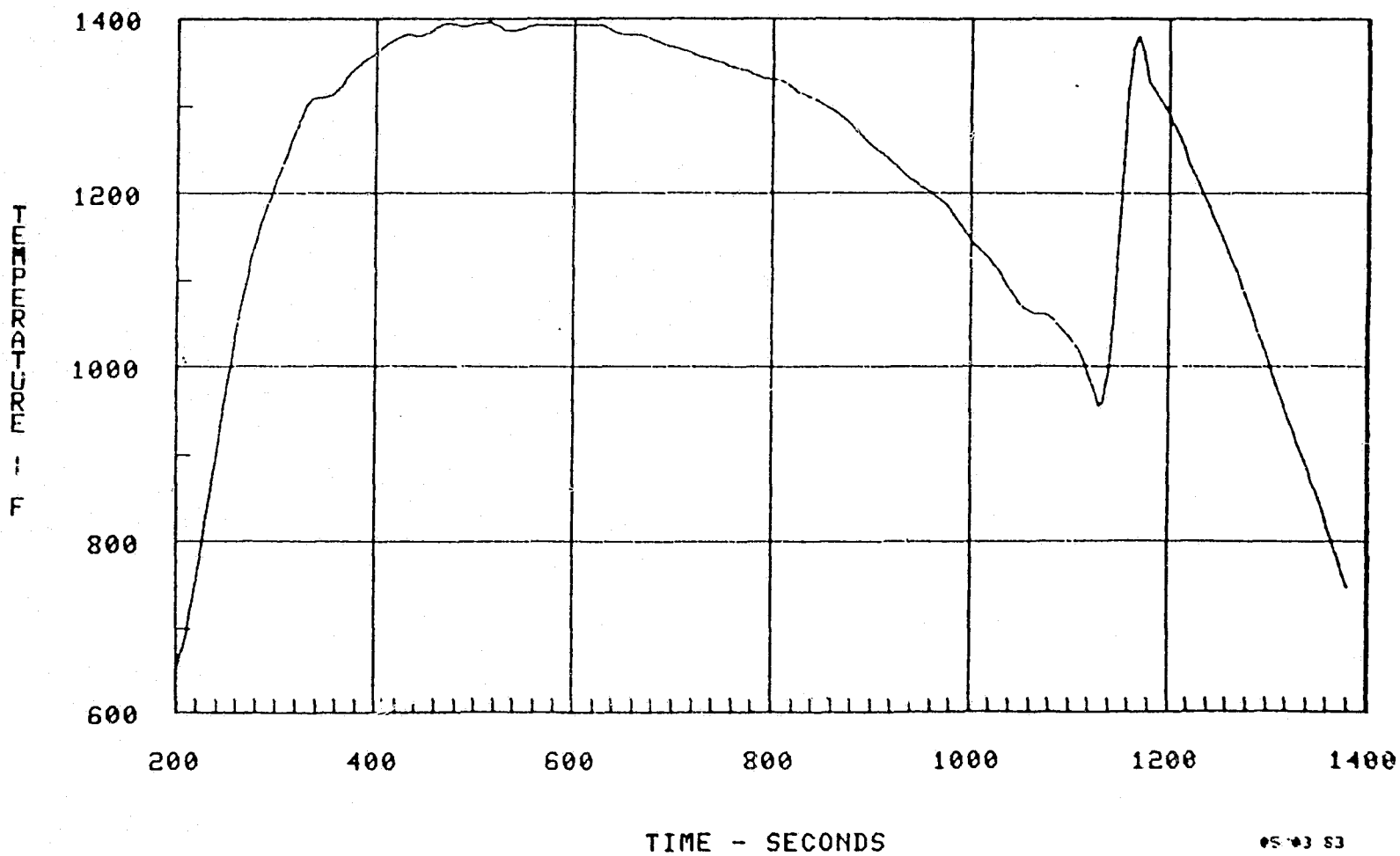
STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

U07T9674A



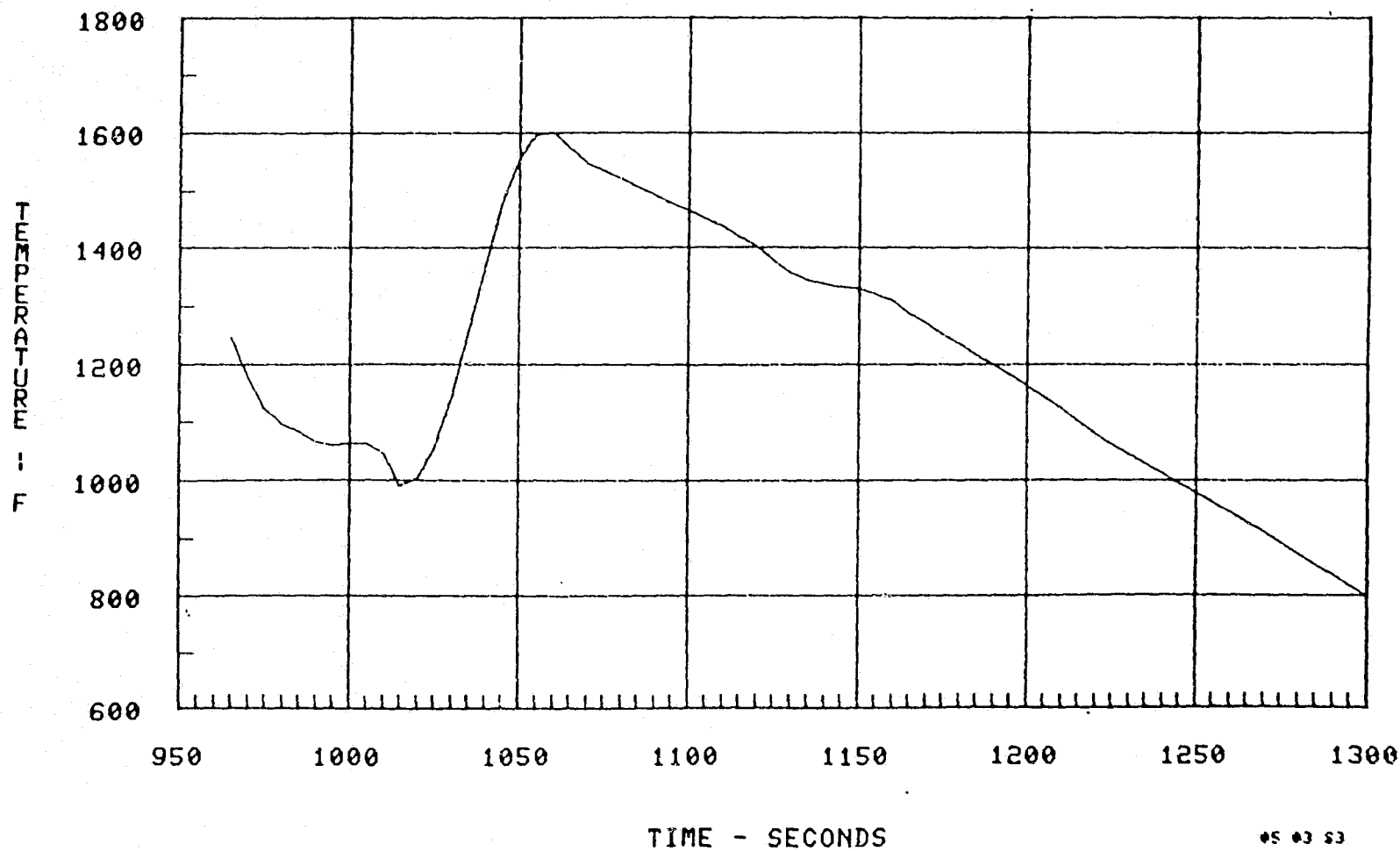
STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.68$

U07T9674A



STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U07T9674A



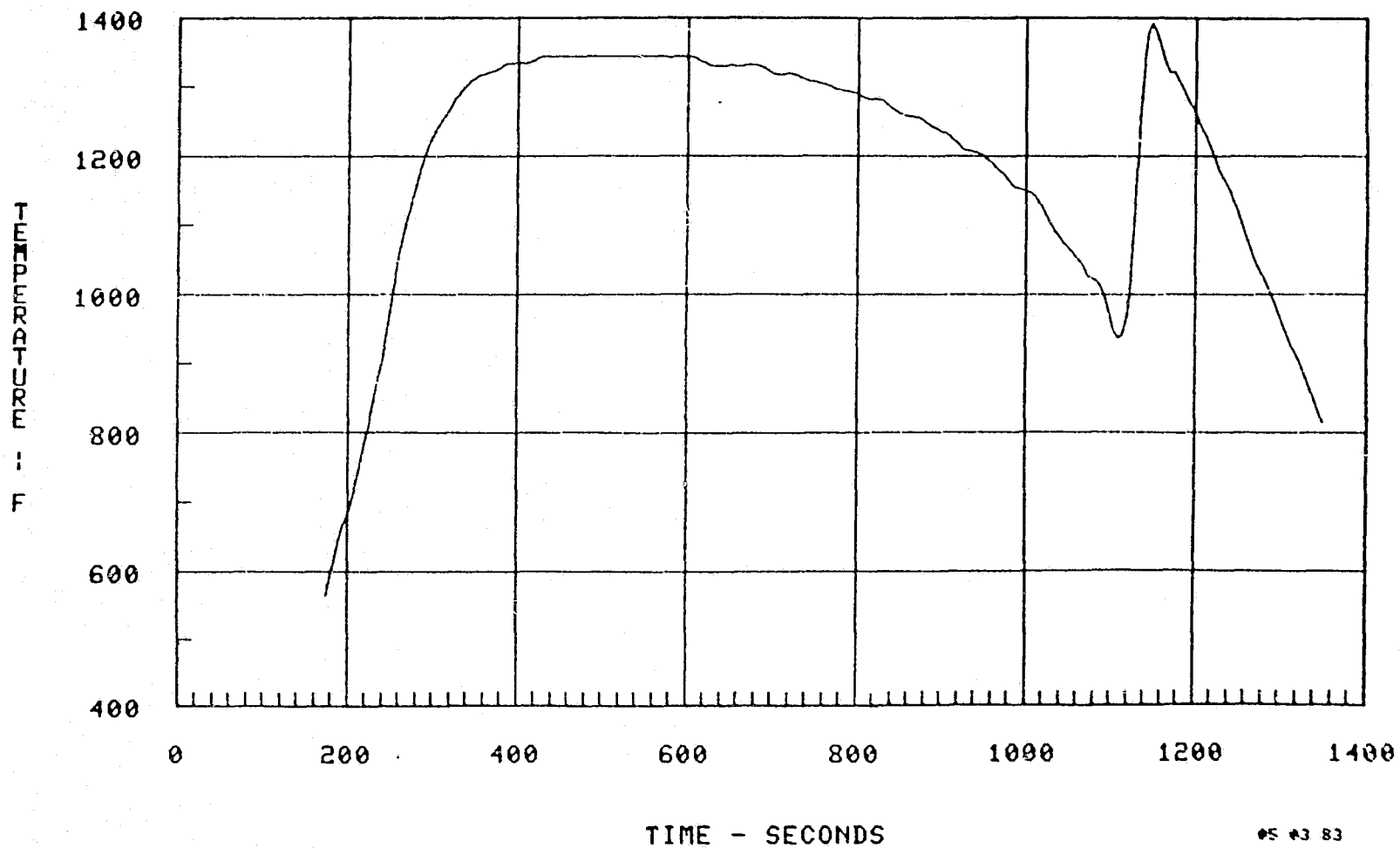
B-199

ORIGINAL MADE IS
OF POOR QUALITY

05 03 83

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.68

U67T9674A



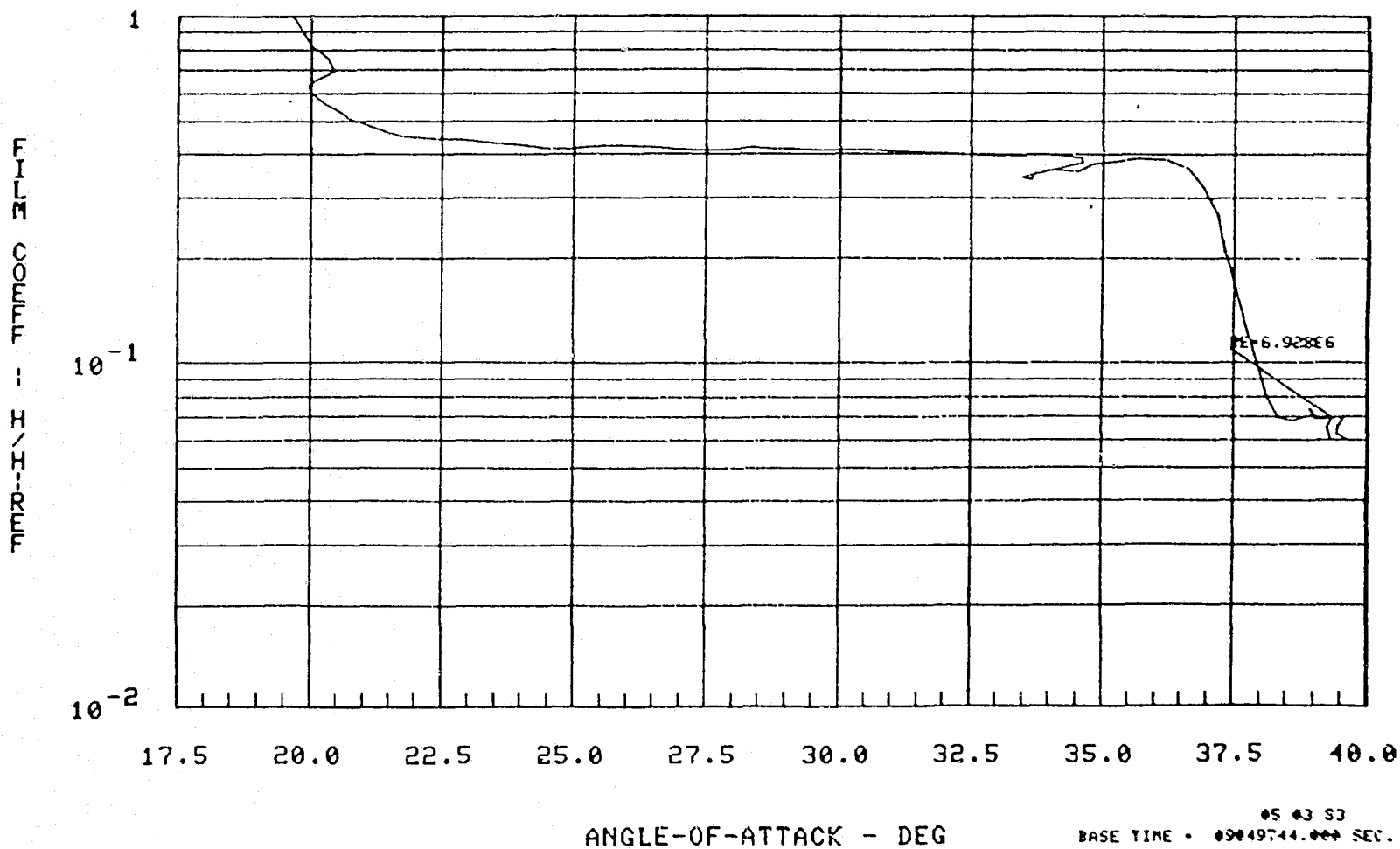
ORIGINAL PAGE IS
OF POOR QUALITY

B-200

05 43 83

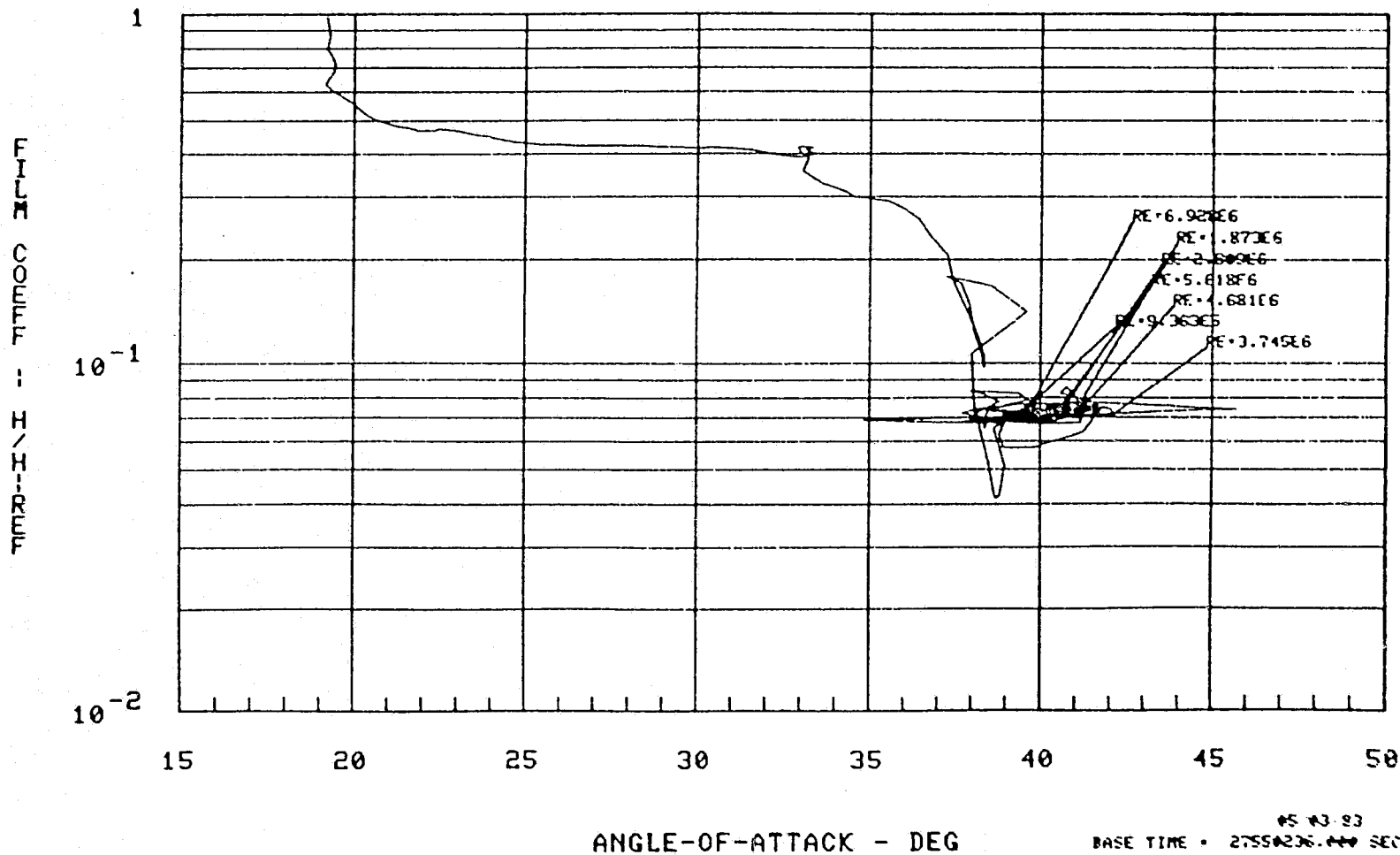
STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.79$

U07T9676A/H-REF 1065-1460 SEC



STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.79$

U07T9676A/H-REF 200-1480 SEC

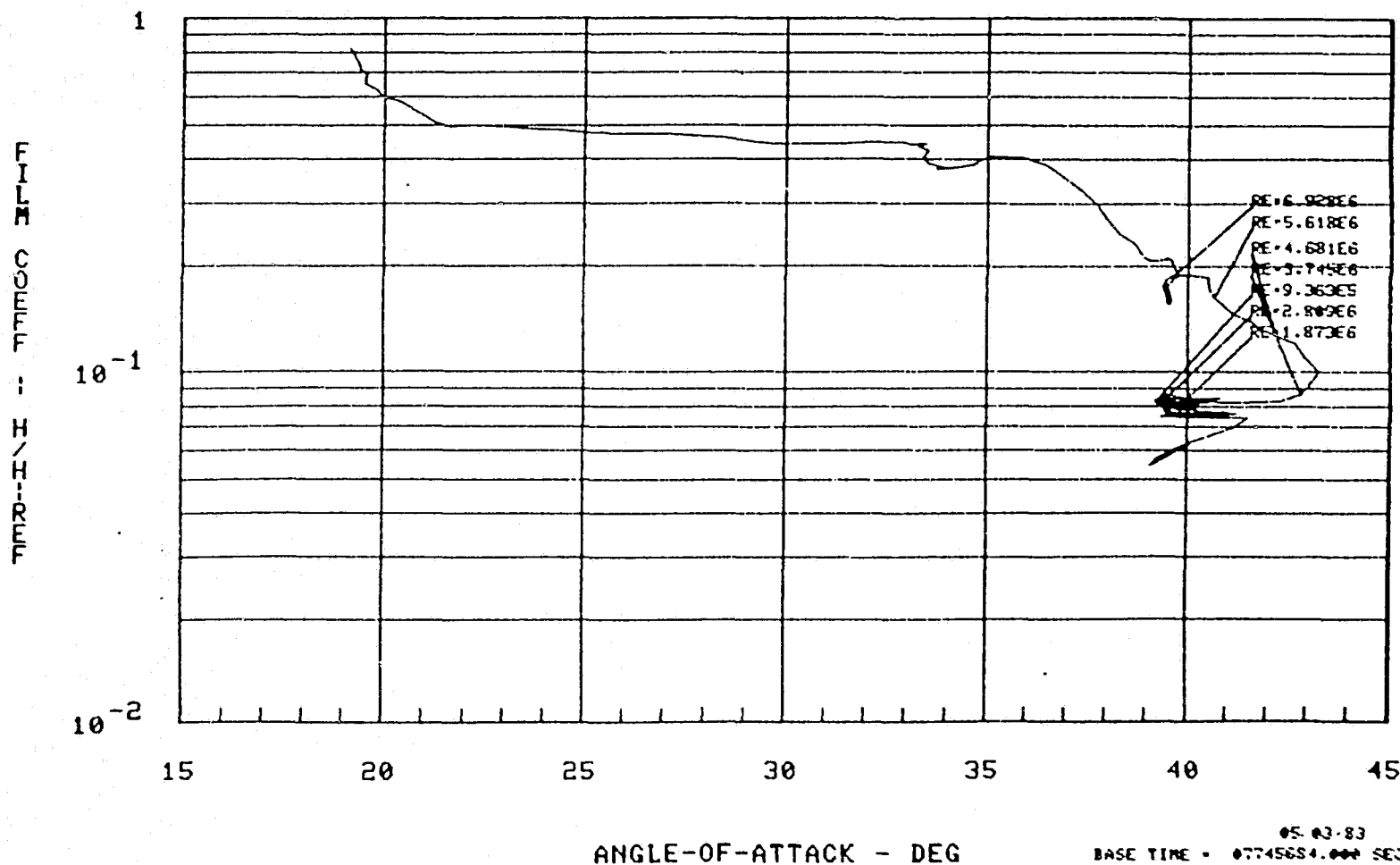


B-202

ORIGINAL PAGE IS
OF POOR QUALITY

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.79

U07T9676A/H-REF 200-1380 SEC

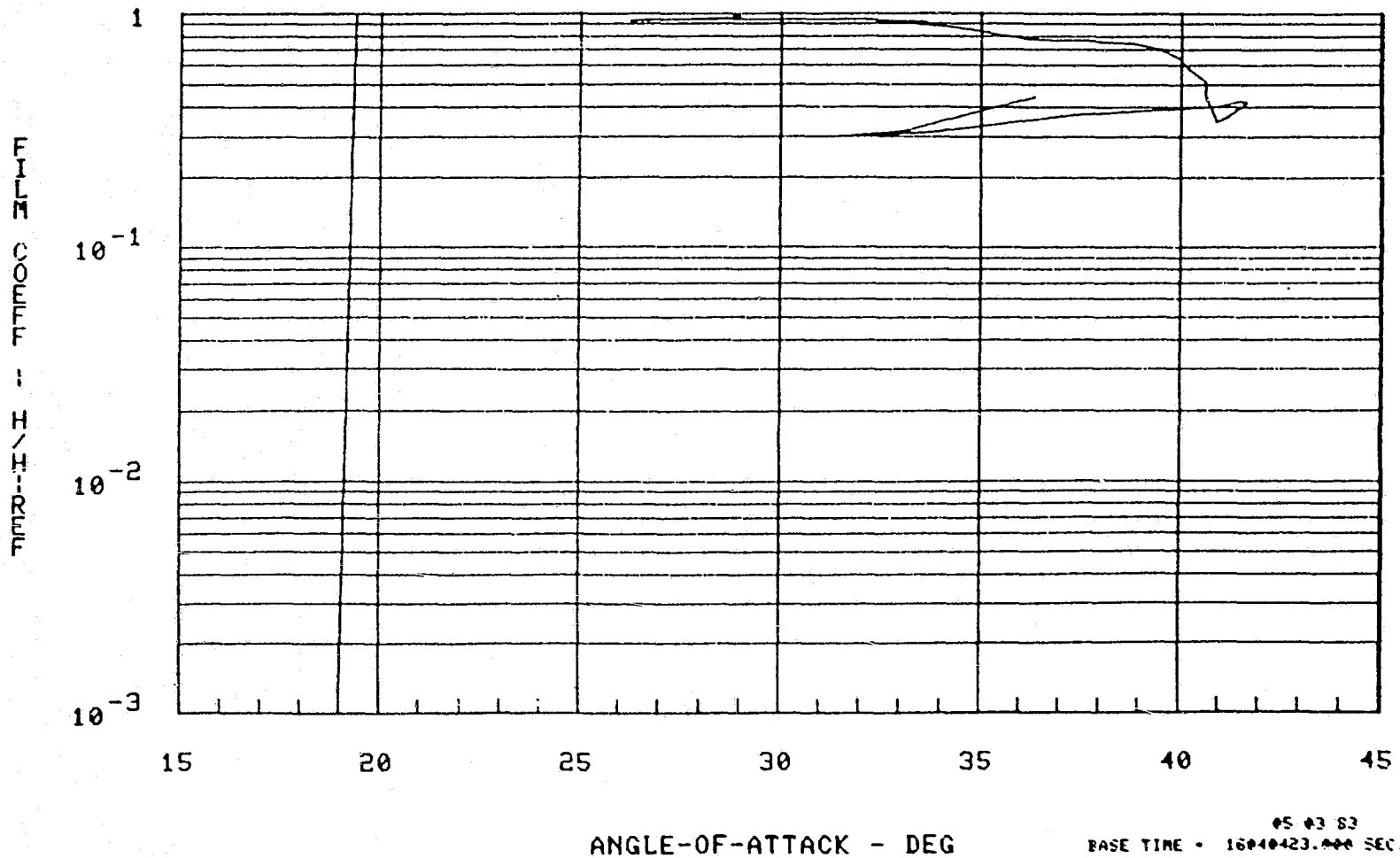


ORIGINAL PAGE IS
OF POOR QUALITY

B-203

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.79

U07T9676A/H-REF 965-1300 SEC



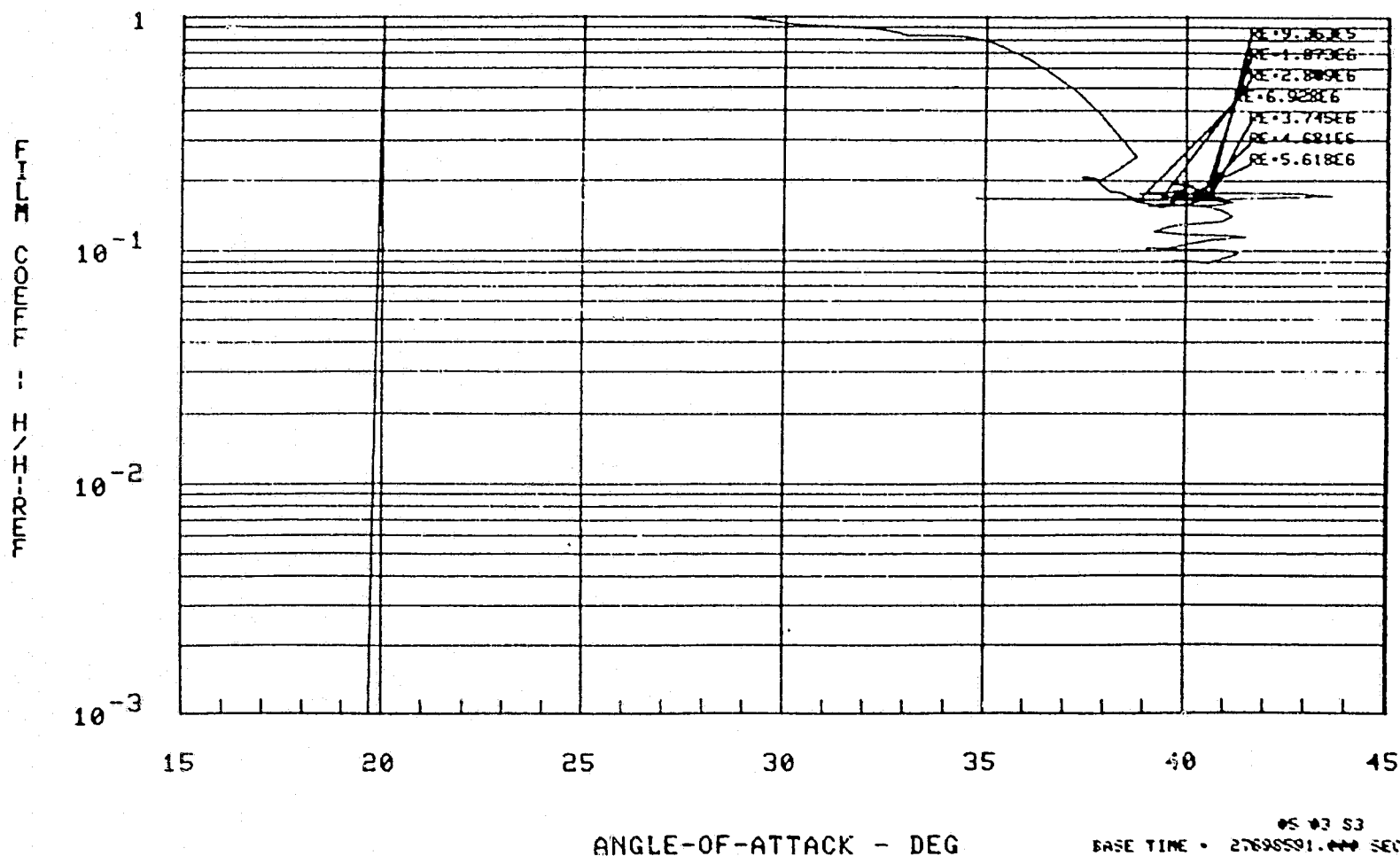
ORIGINAL PAGE IS
OF POOR QUALITY

B-204

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.79

U07T9676A/H-REF 150-1350 SEC

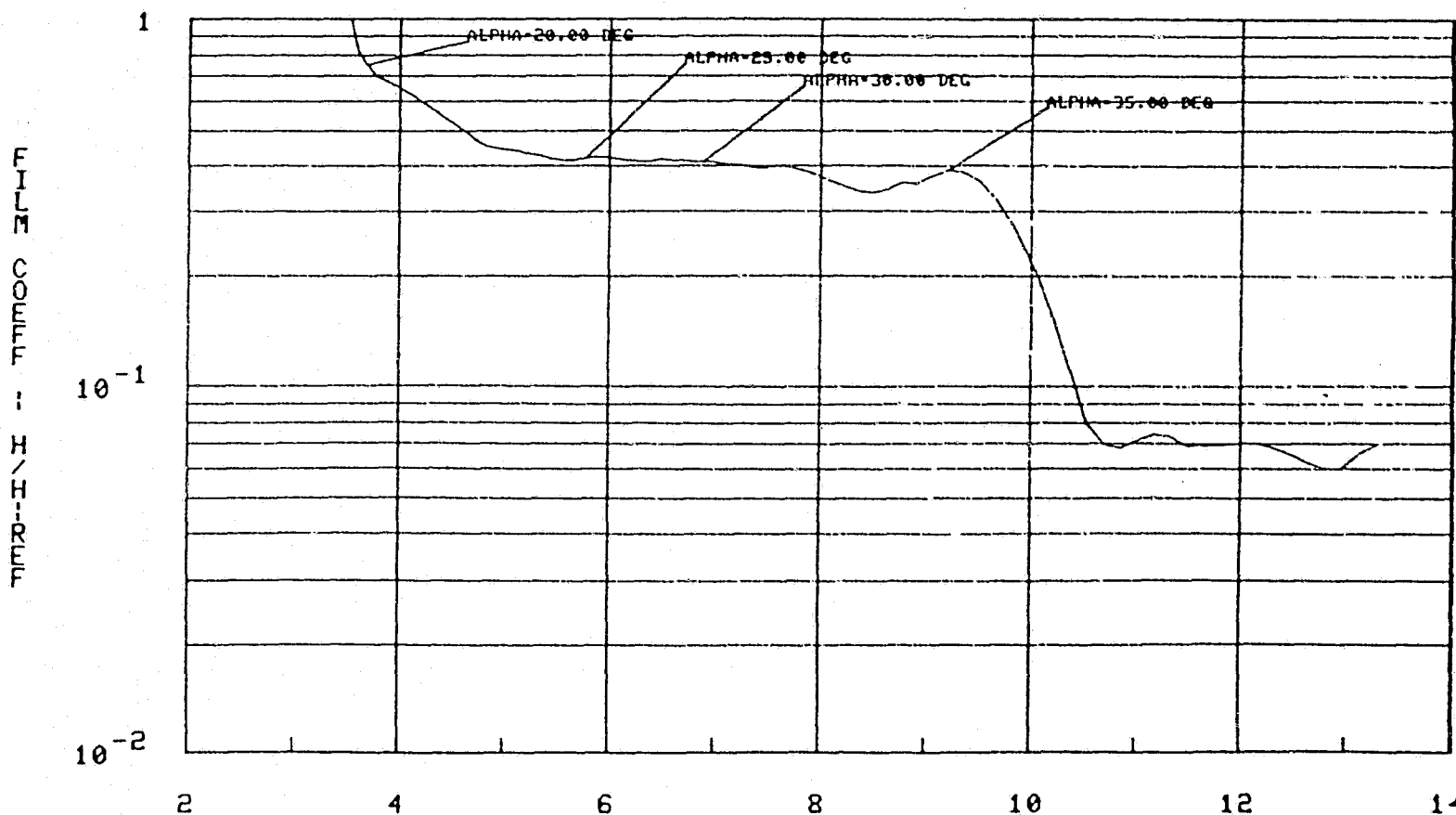
FLIGHT DATA MAY BE IN ERROR



ORIGINAL COPY
OF PLOT

STS-1 (107 FT LENGTH WING 50% SPAN) X/C=0.79

U07T9676A/H-REF 1065-1460 SEC



B-206

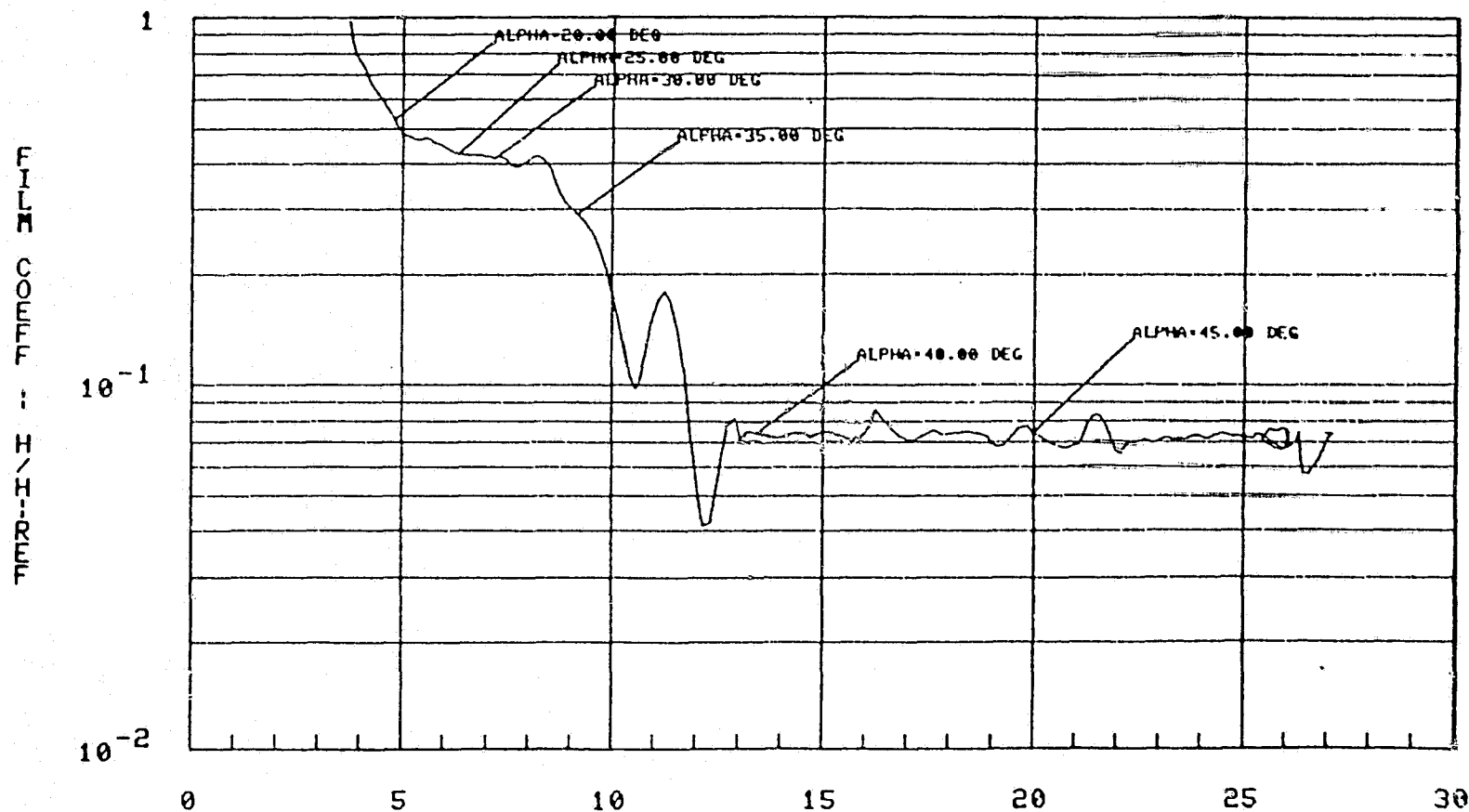
ORIGINAL PAGE IS
OF POOR QUALITY

MACH NUMBER

05.03 S3
BASE TIME - 09049744.000 SEC.

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.79$

U07T9676A/H-REF 200-1480 SEC



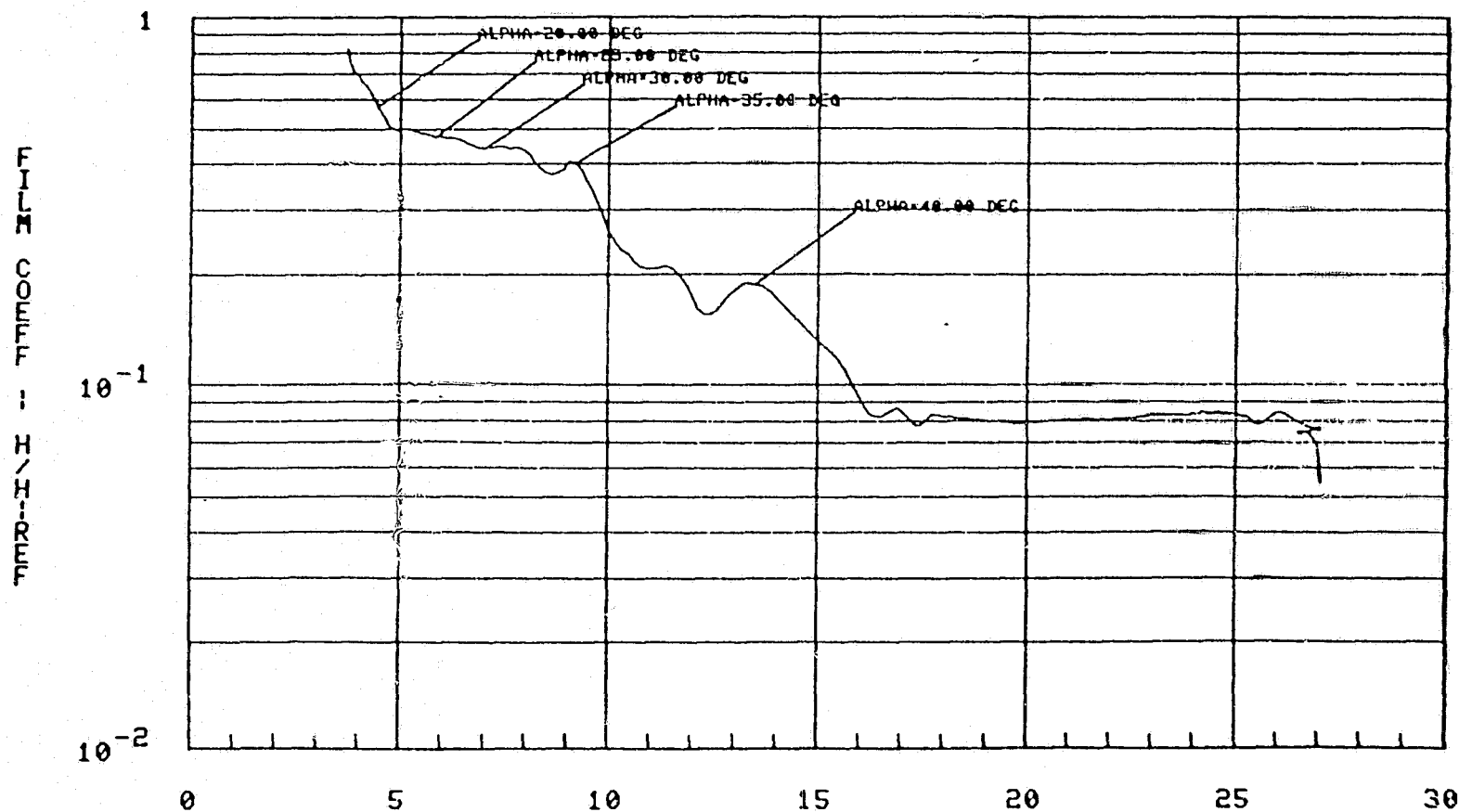
B-207

MACH NUMBER

05-03-23
BASE TIME = 27550236.000 SEC.

STS-3 (107 FT LENGTH WING 50% SPAN) $X/C=0.79$

U07T9676A/H-REF 200-1380 SEC



B-208

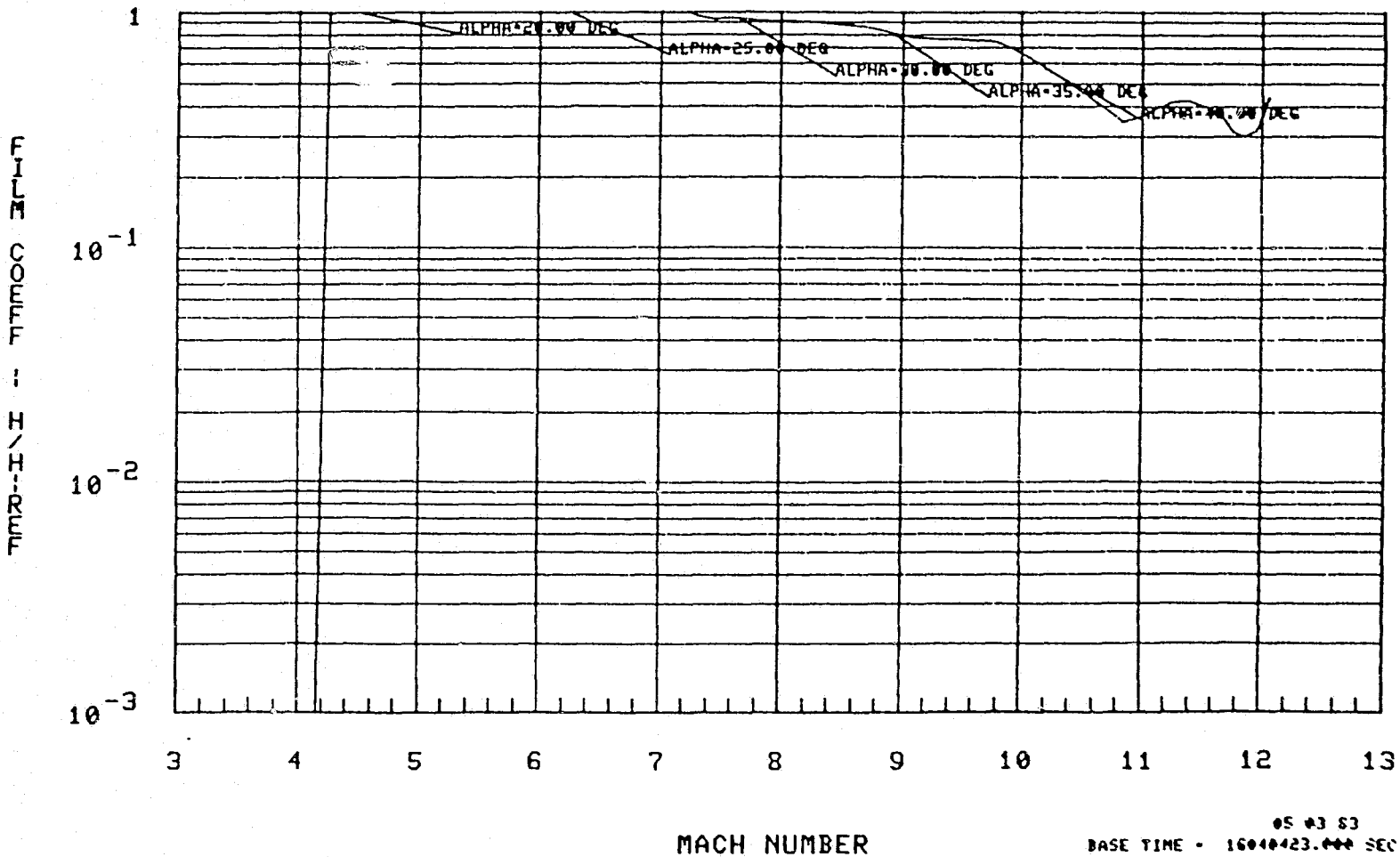
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OF POOR QUALITY

MACH NUMBER

05 03 '83
BASE TIME = 07745684.000 SEC.

STS-4 (107 FT LENGTH WING 50% SPAN) X/C=0.79

U07T9676A/H-REF 965-1300 SEC



ORIGINAL STS-4
DE POOR QUALITY

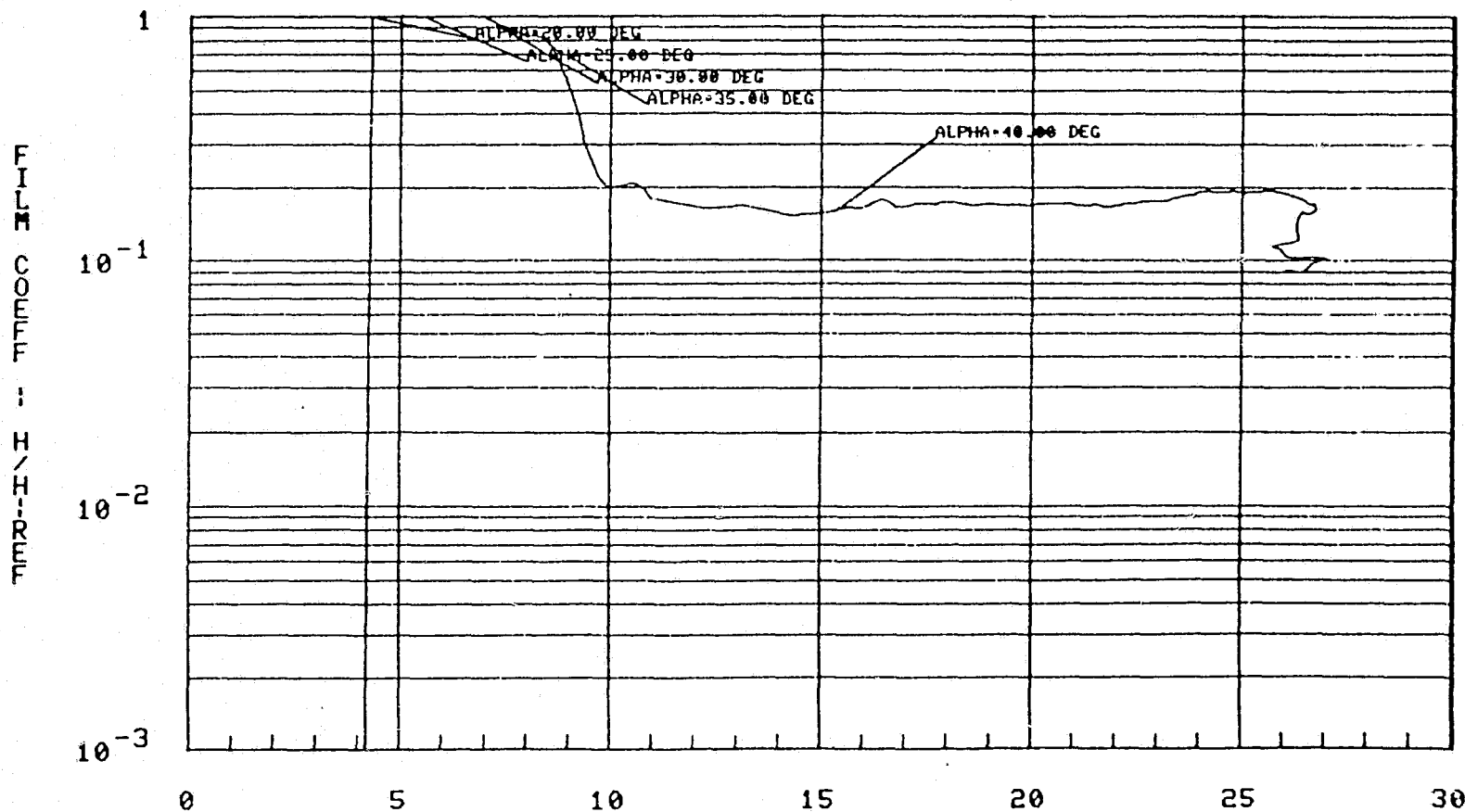
B-209

C-101

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.79

U07T9676A/H-REF 150-1350 SEC

FLIGHT DATA MAY BE IN ERROR



ORIGINAL FILE
OF POOR QUALITY

B-210

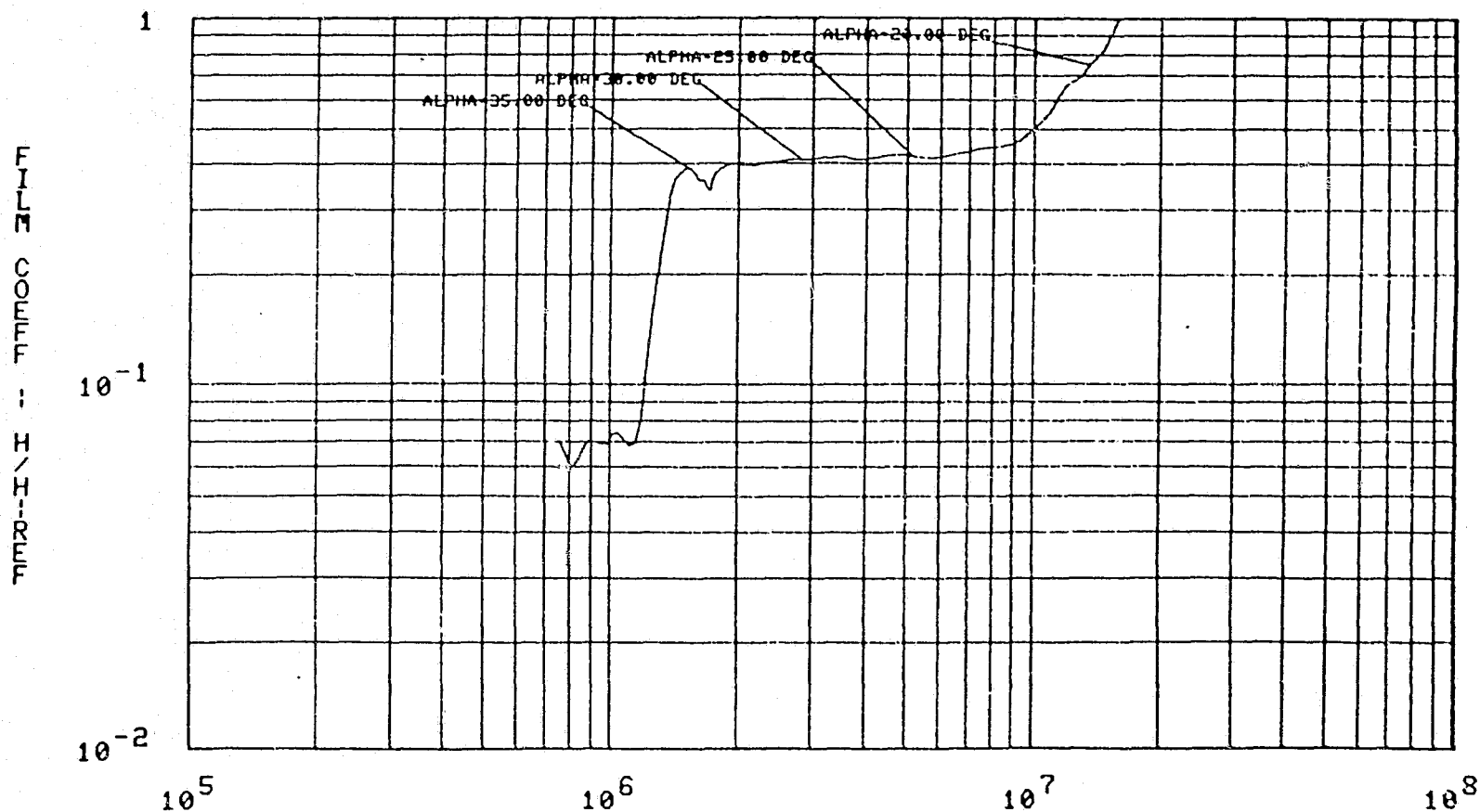
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MACH NUMBER

05 03 S3
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U07T9676A/H-REF 1065-1460 SEC



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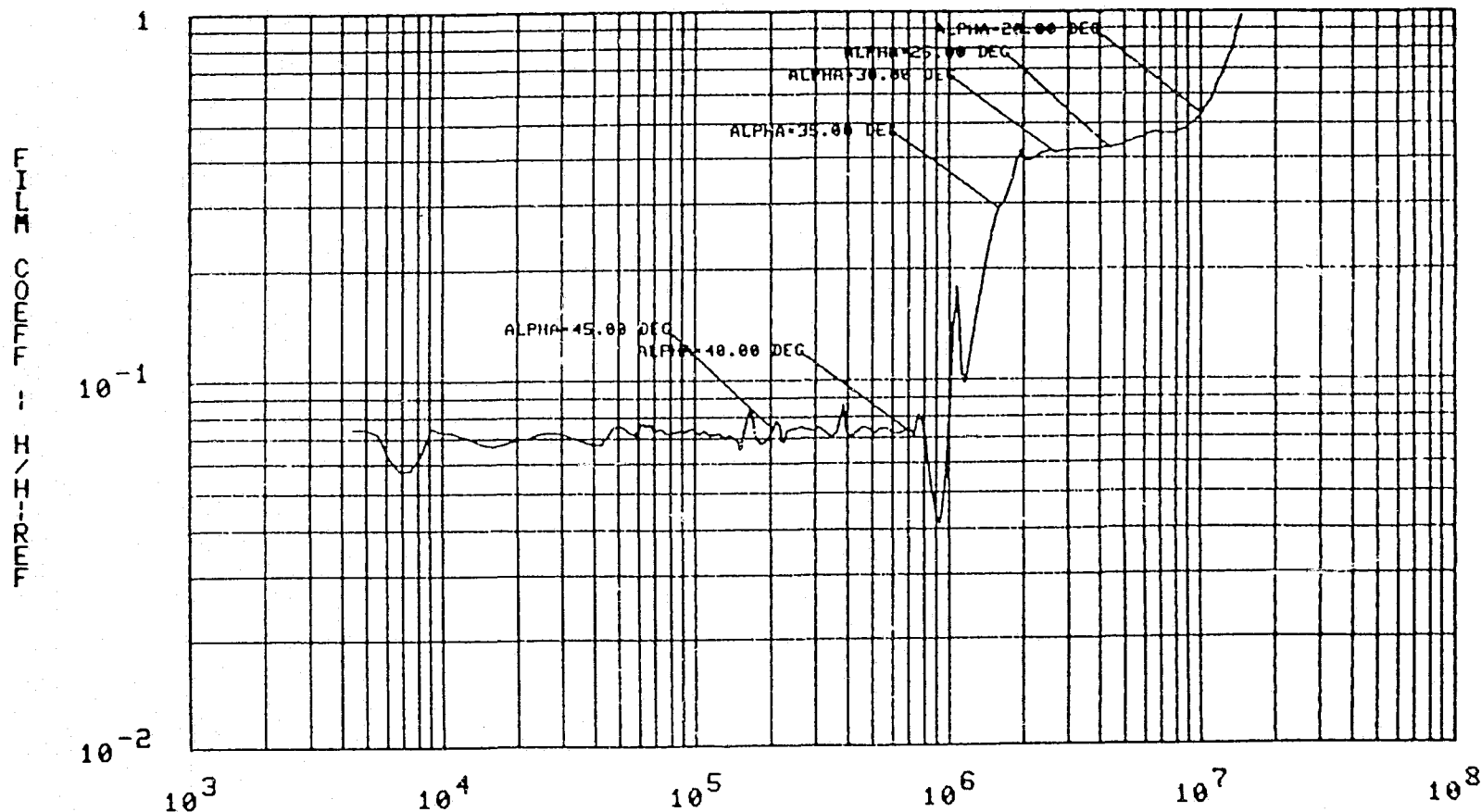
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05-03-83
BASE TIME - 09049744.000 SEC.

8-211

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U07T9676A/H-REF 200-1480 SEC



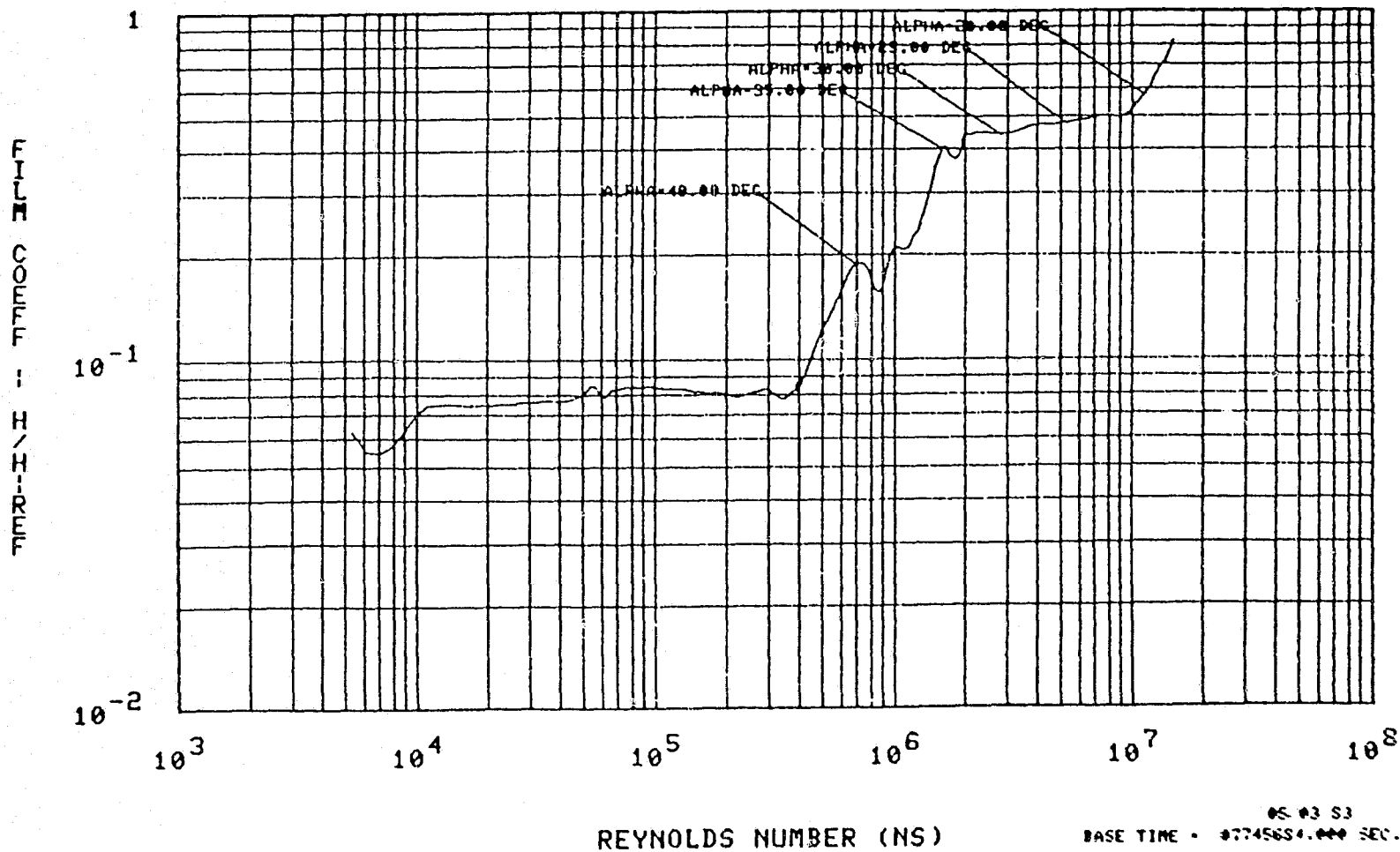
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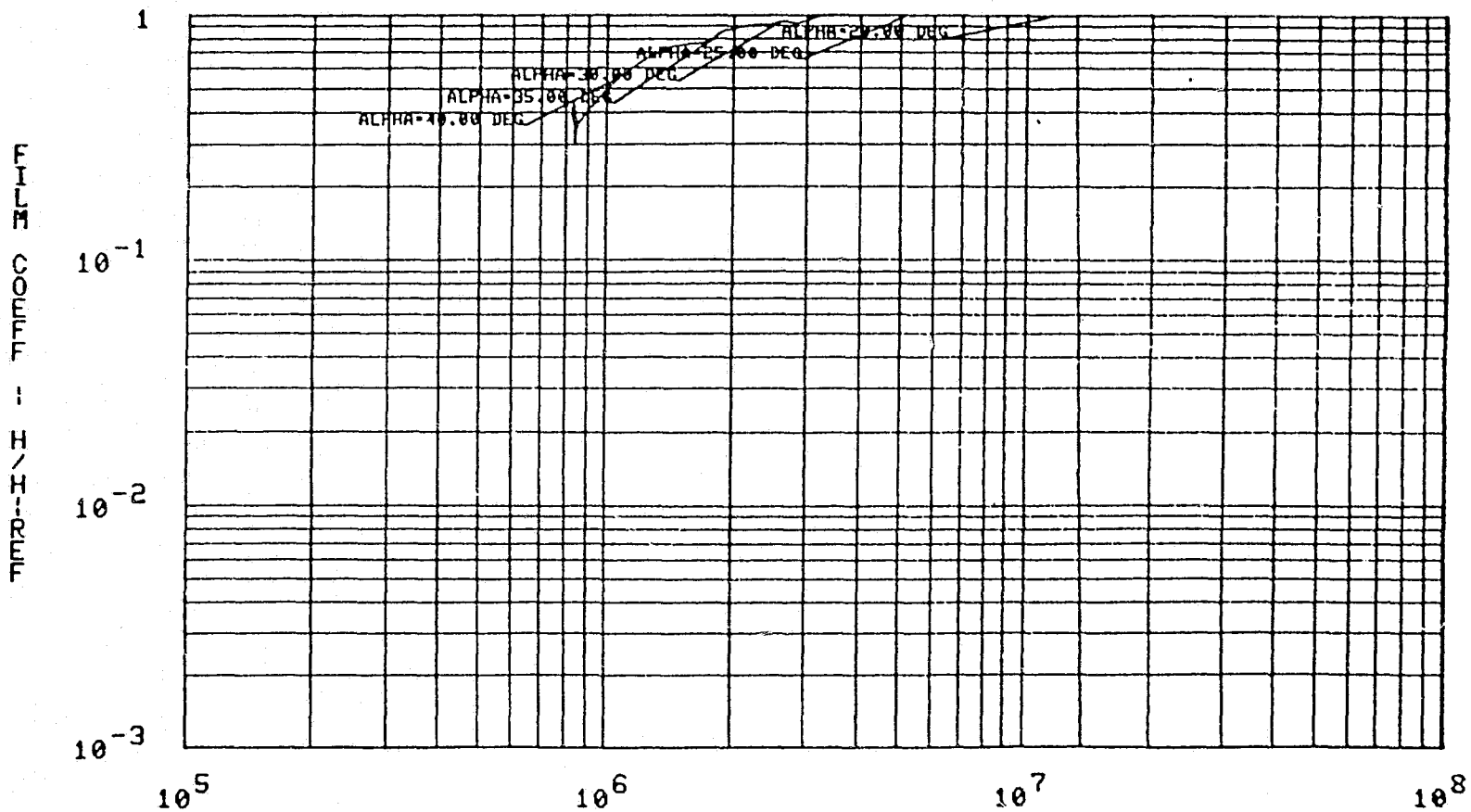
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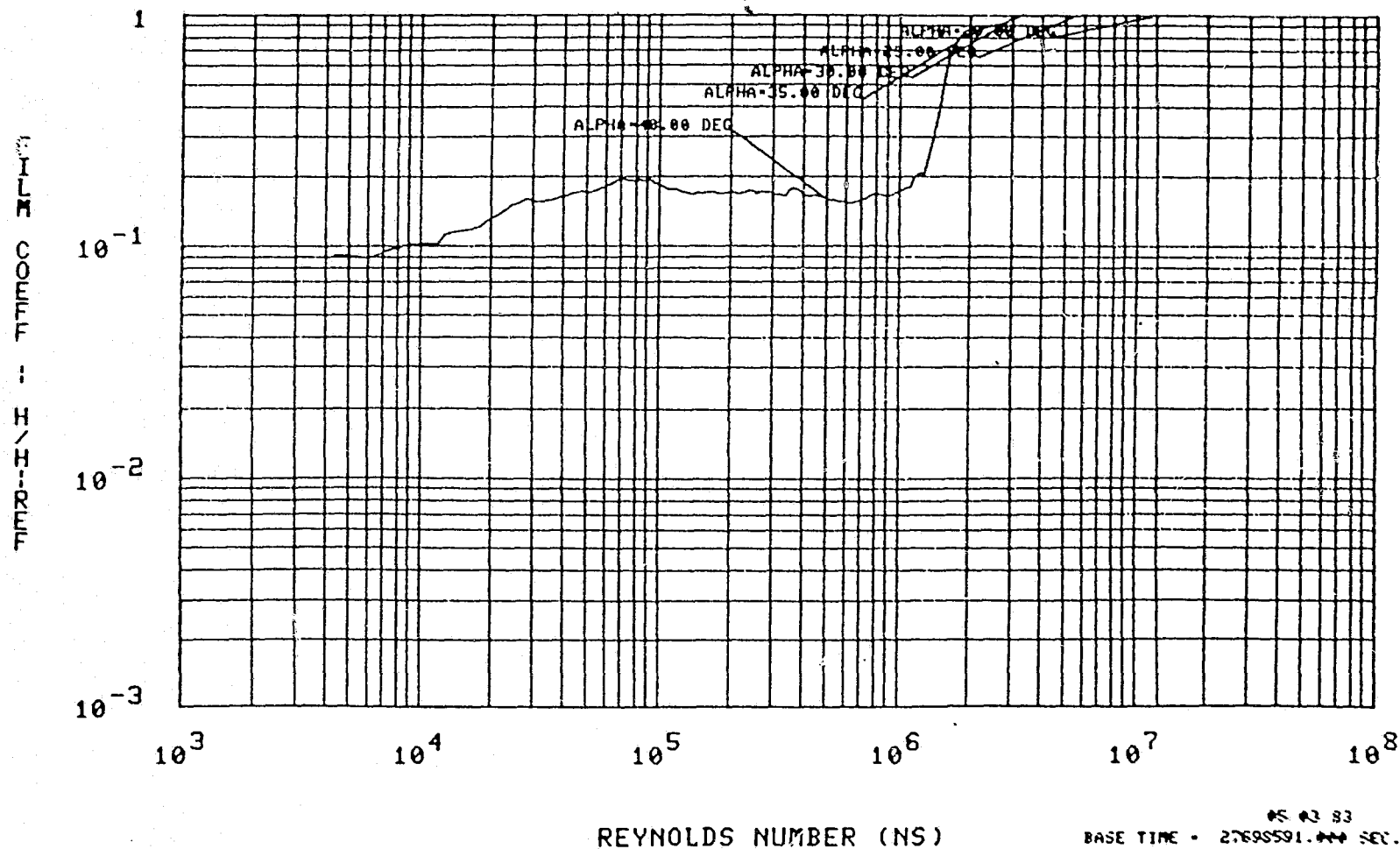
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B-214

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U07T9676A/H-REF 150-1350 SEC

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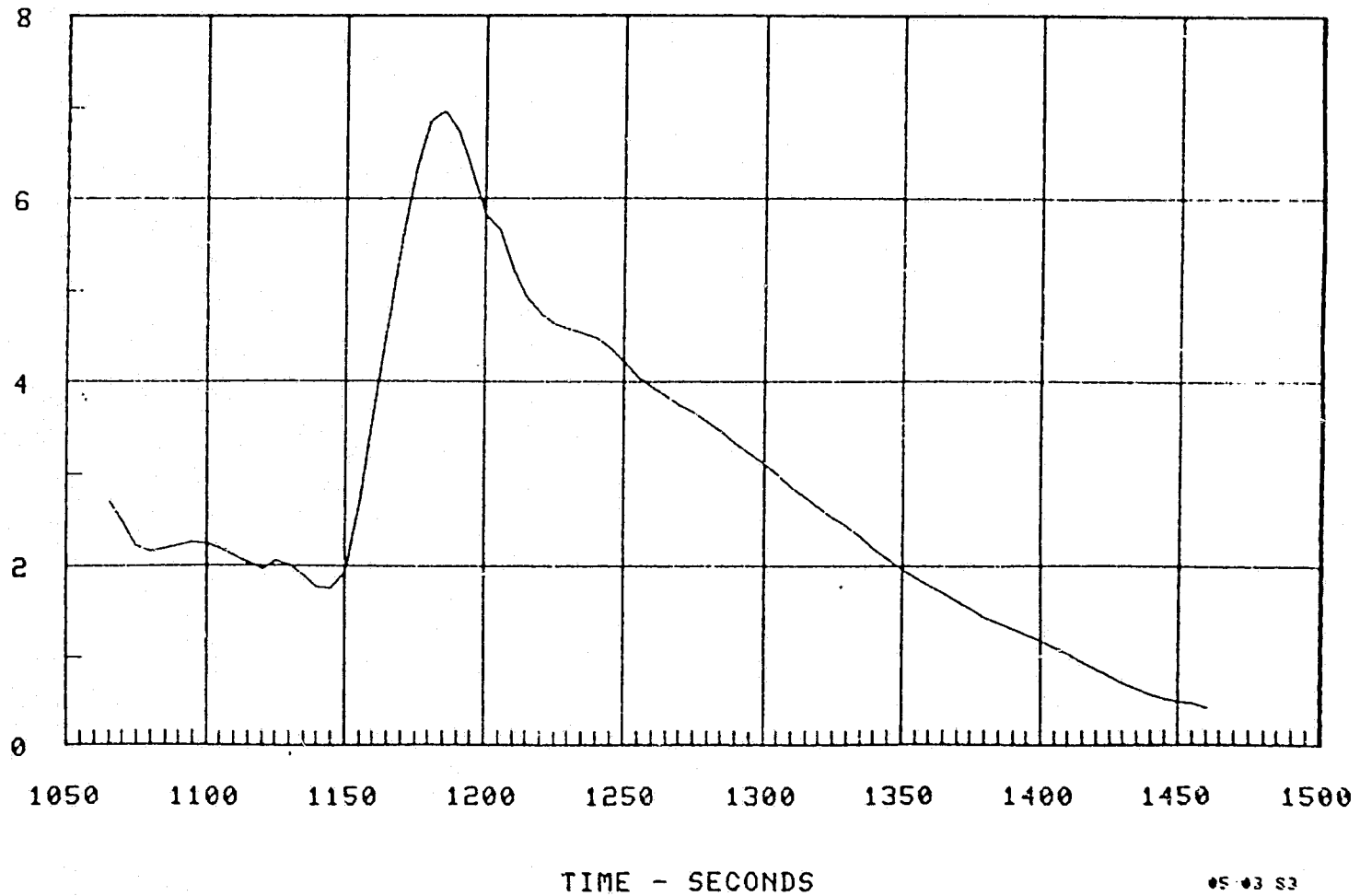
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U07T9676A

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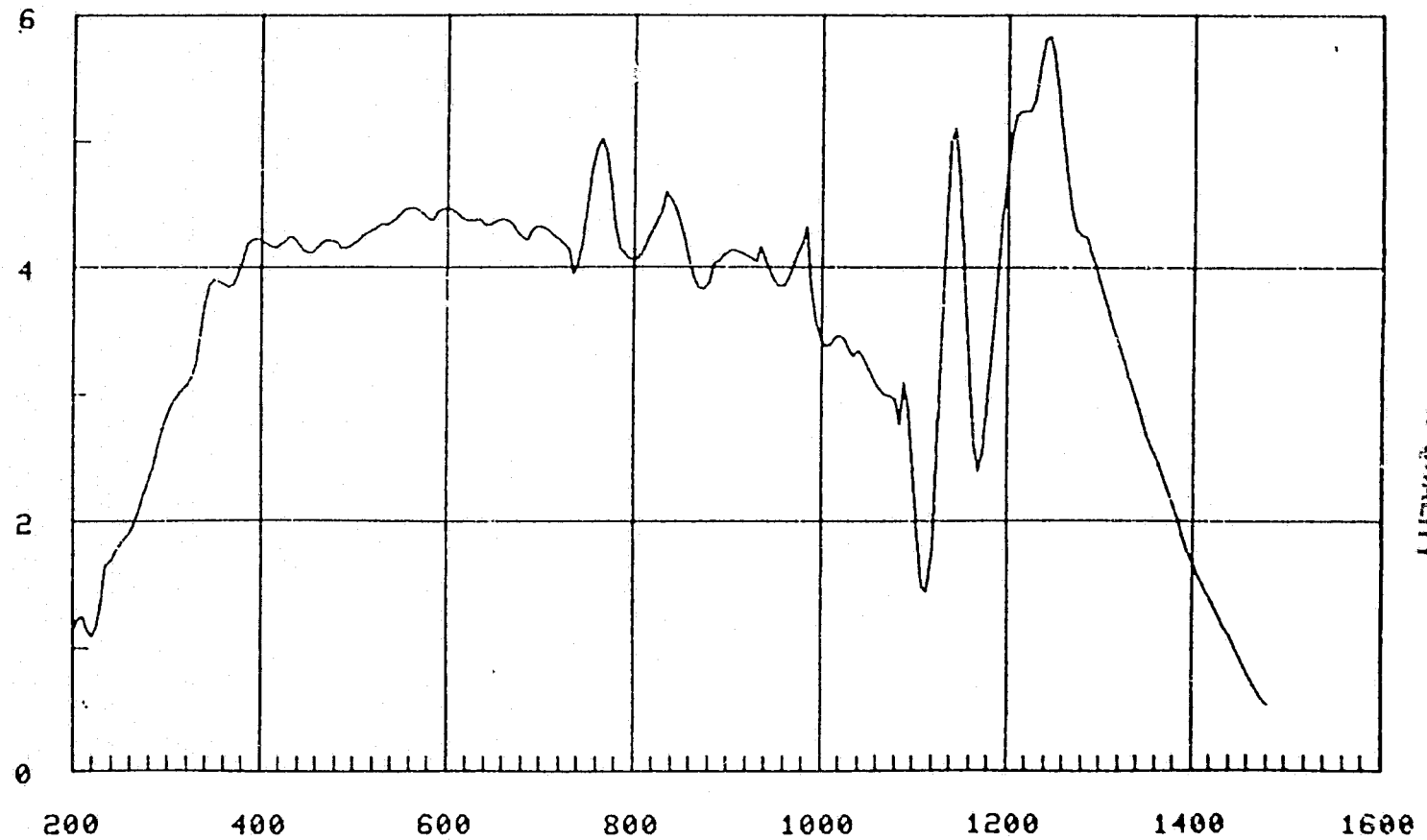
05-03 S3

B-216

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.79$

U07T9676A

HEATING RATE - BULB TEMPERATURE - SEC



TIME - SECONDS

05 43 53

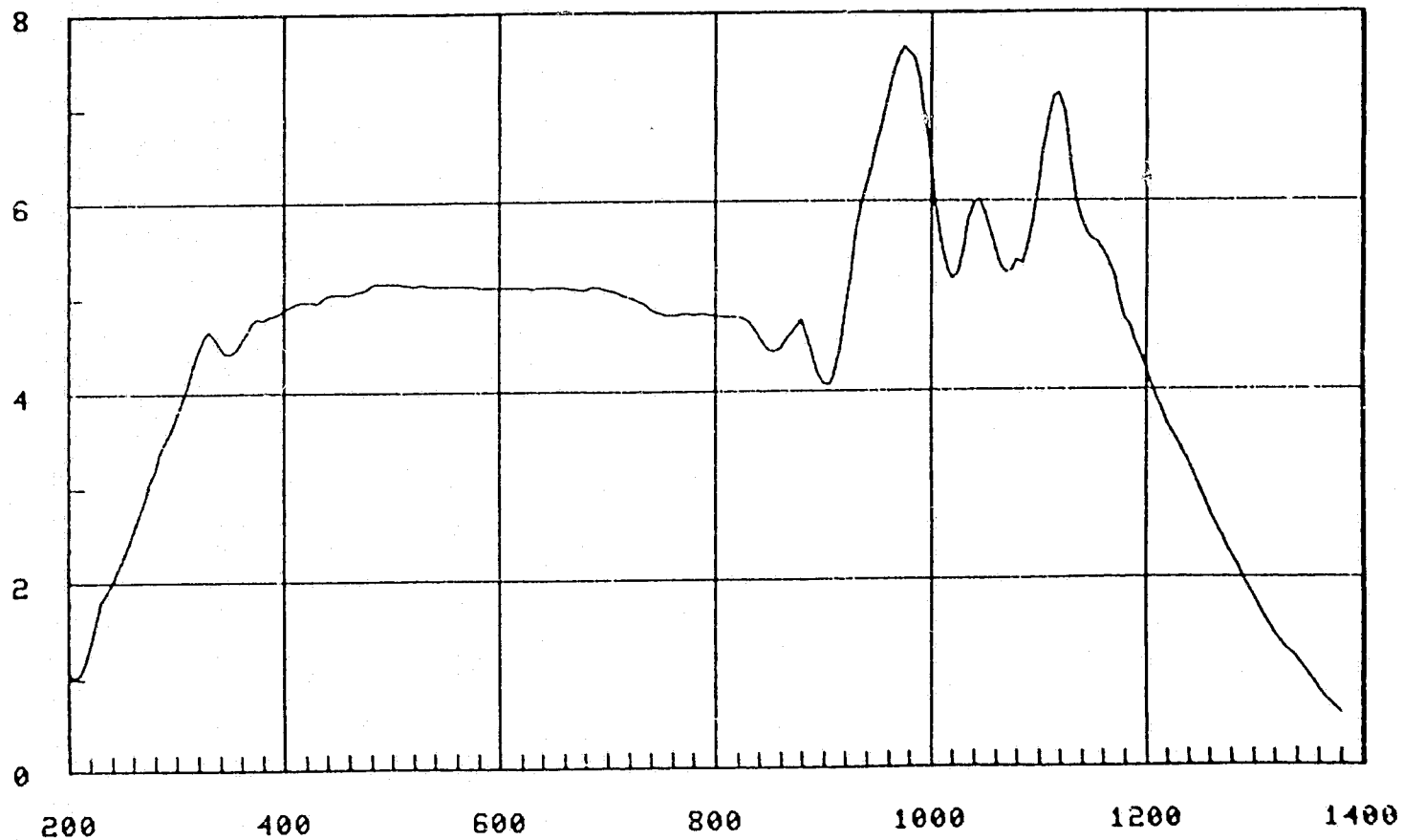
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U07T9676A

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TIME - SECONDS

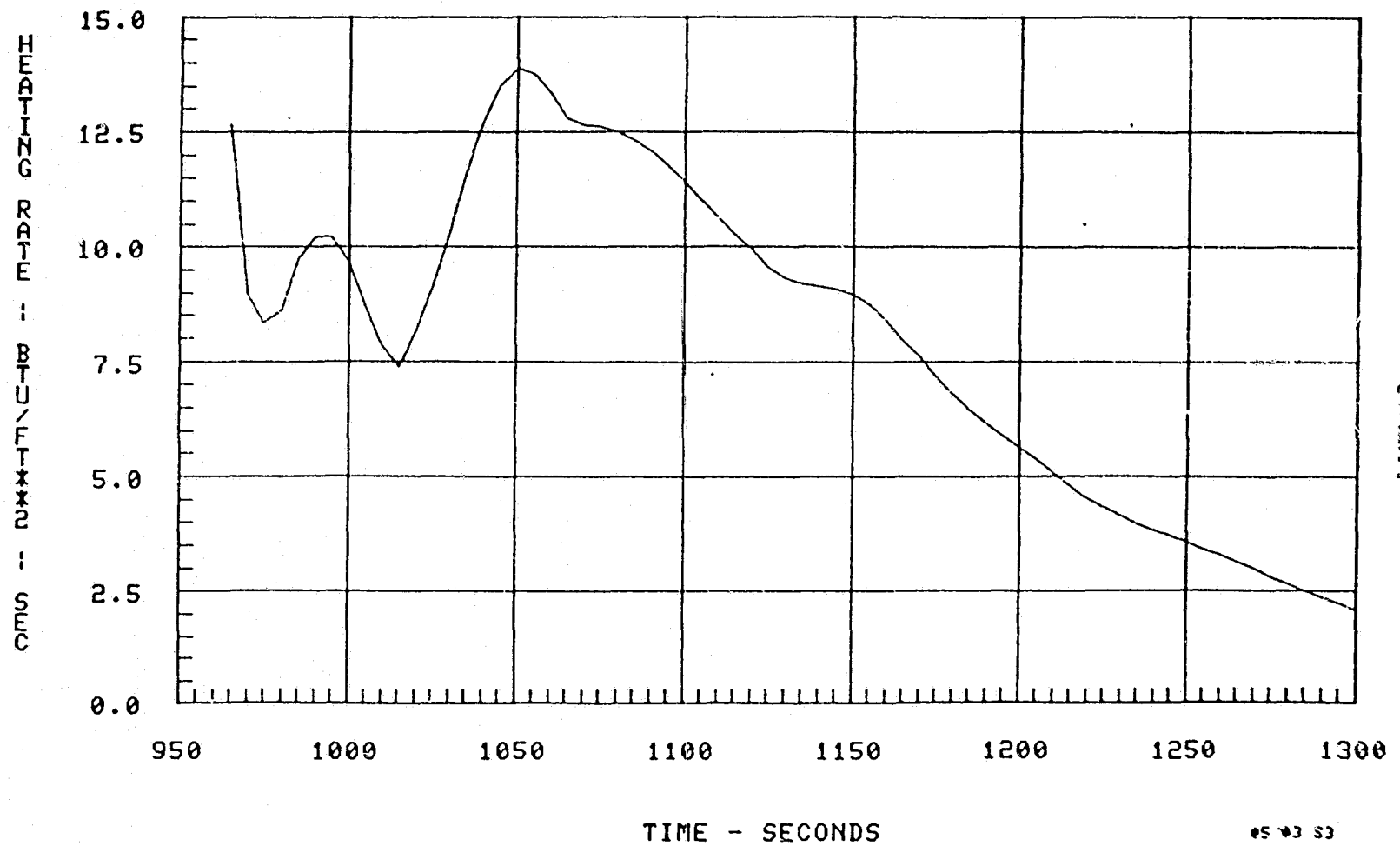
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B-218

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U07T9676A

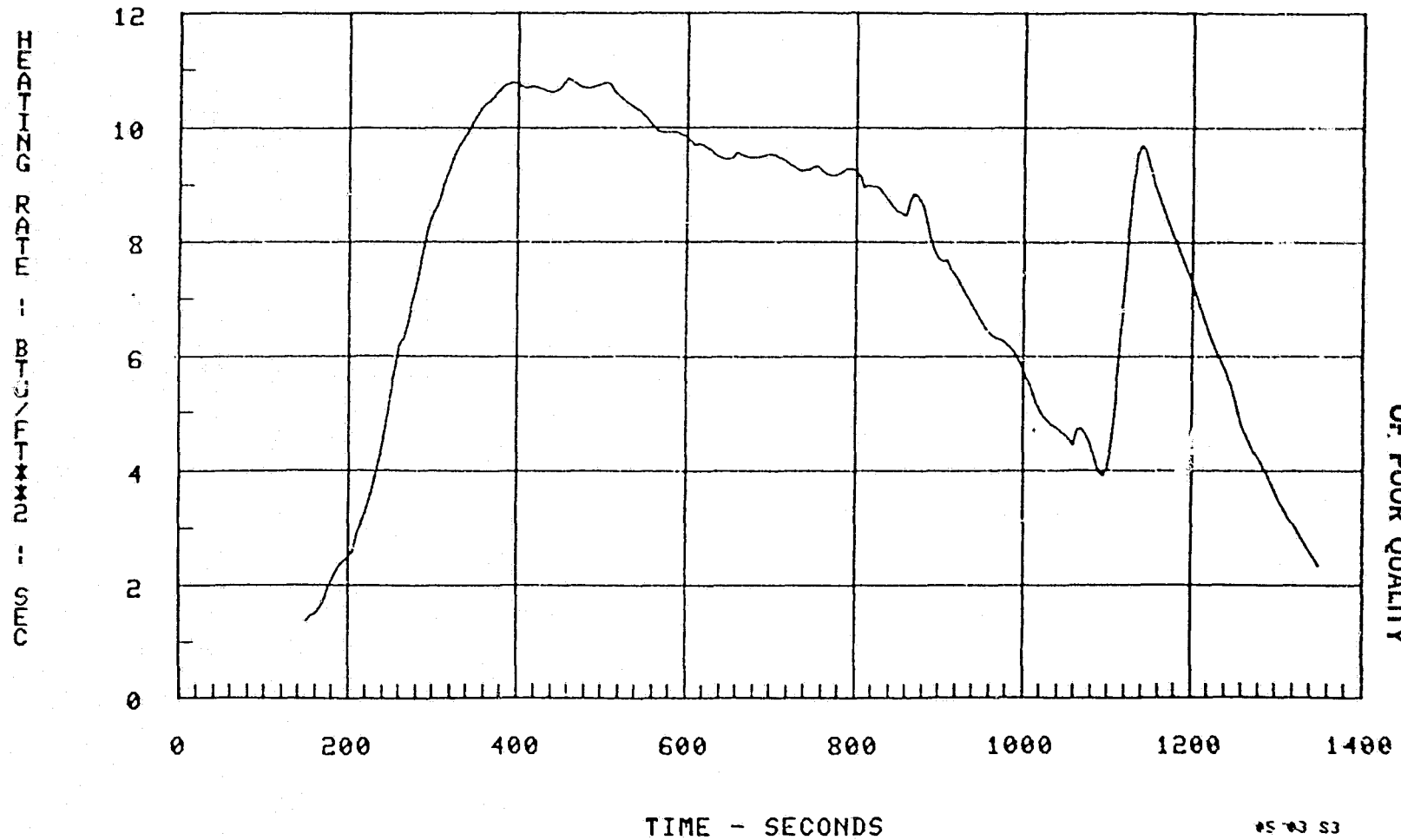


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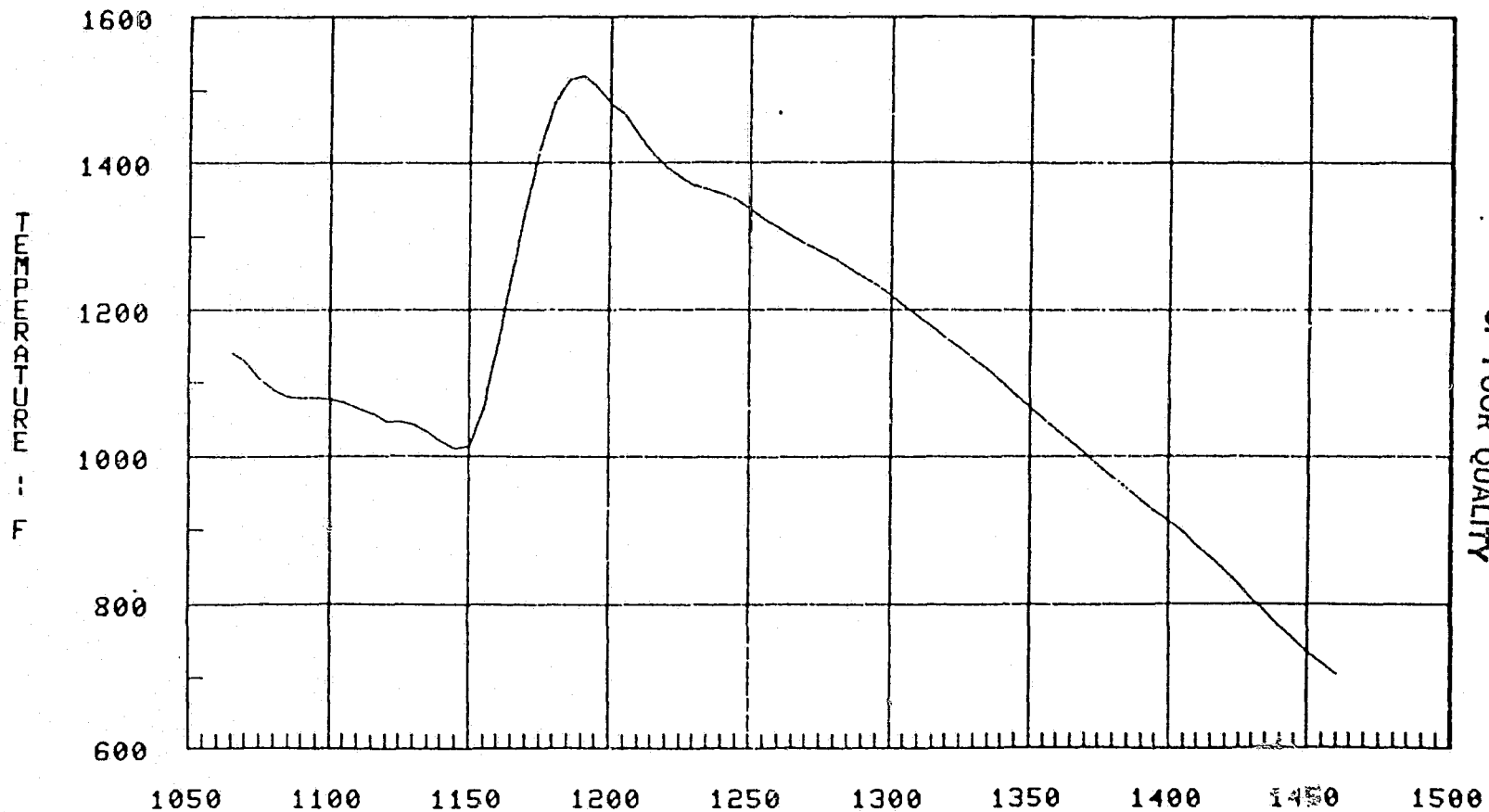
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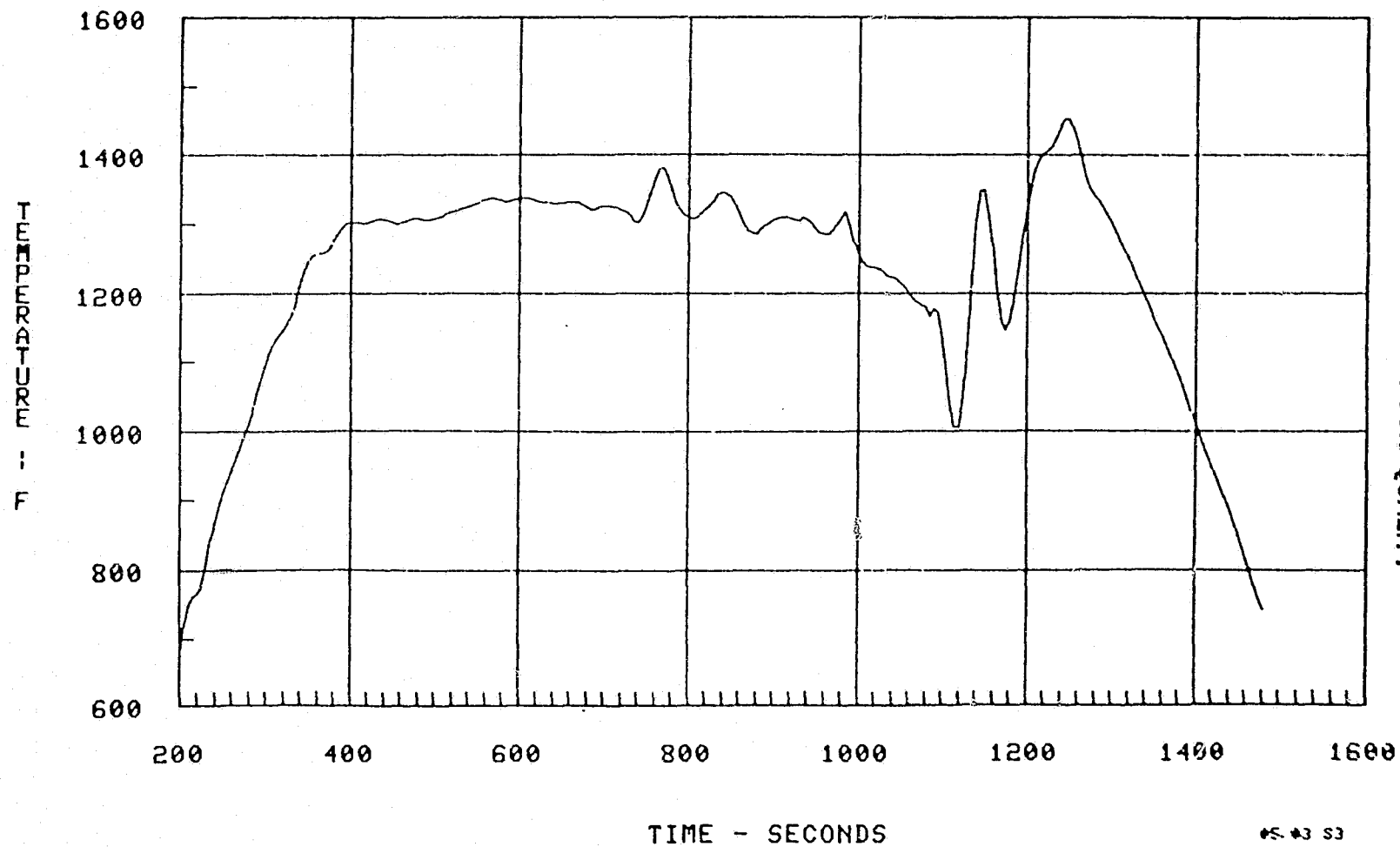


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U07T9676A



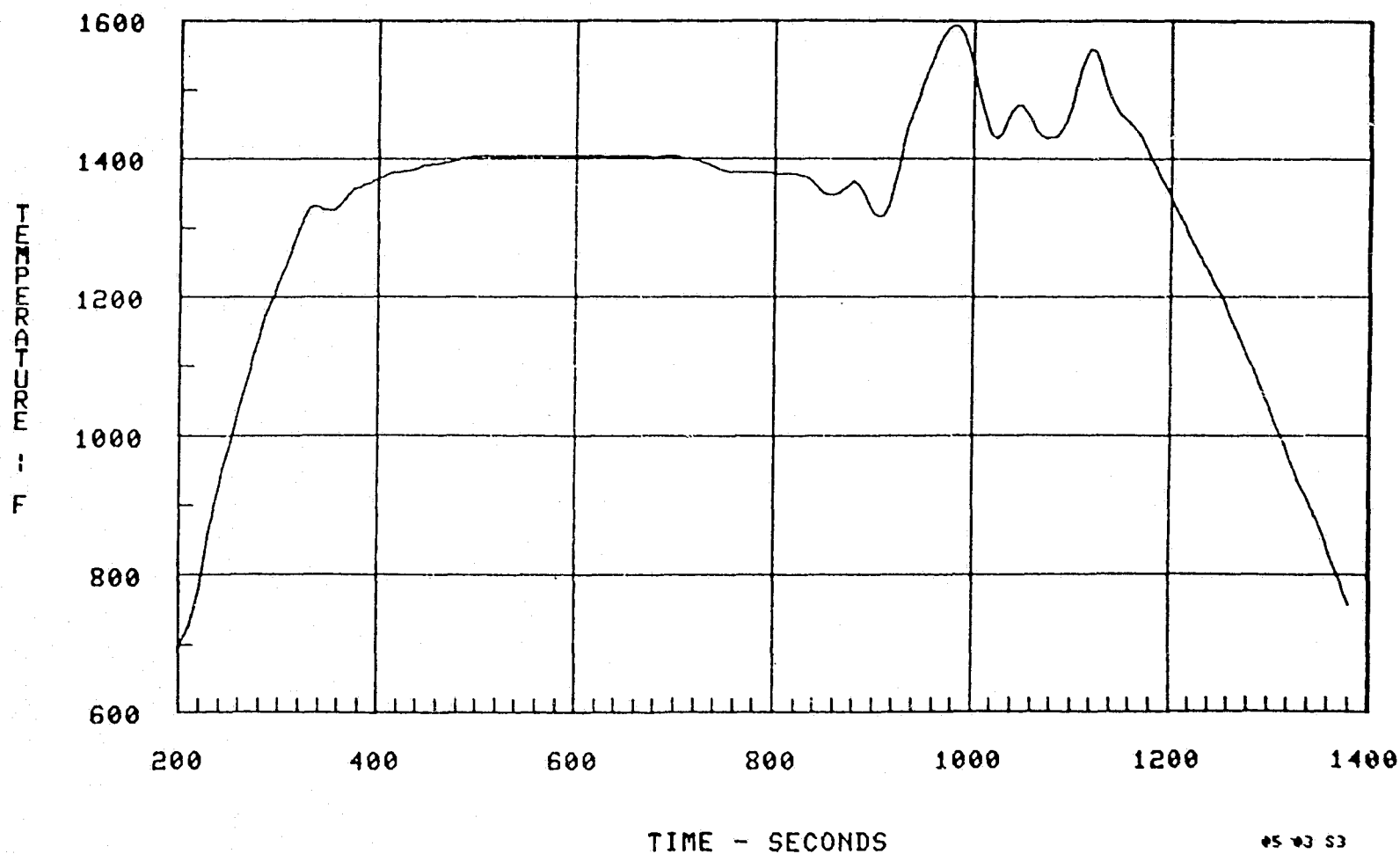
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B-222

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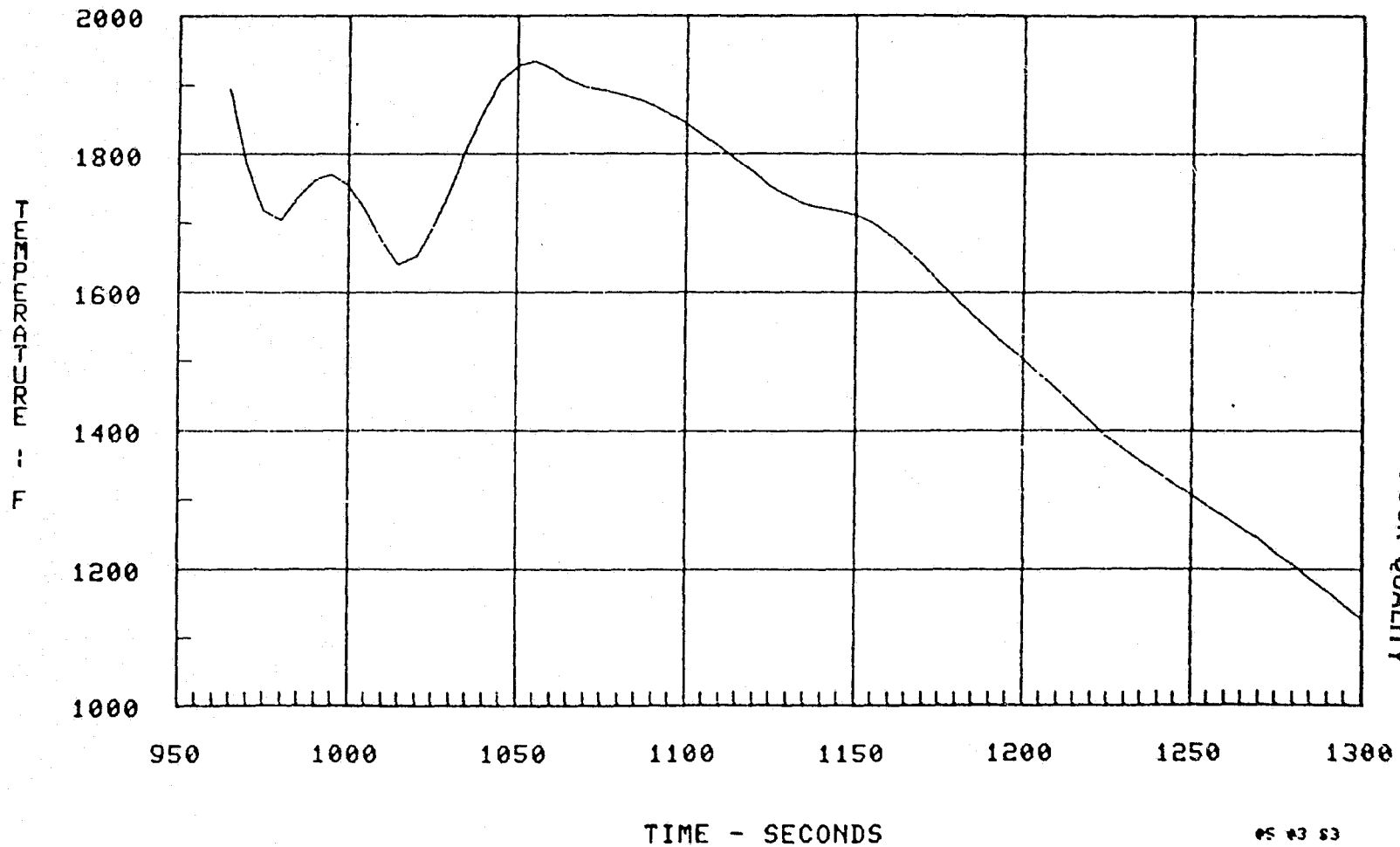


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U07T9676A

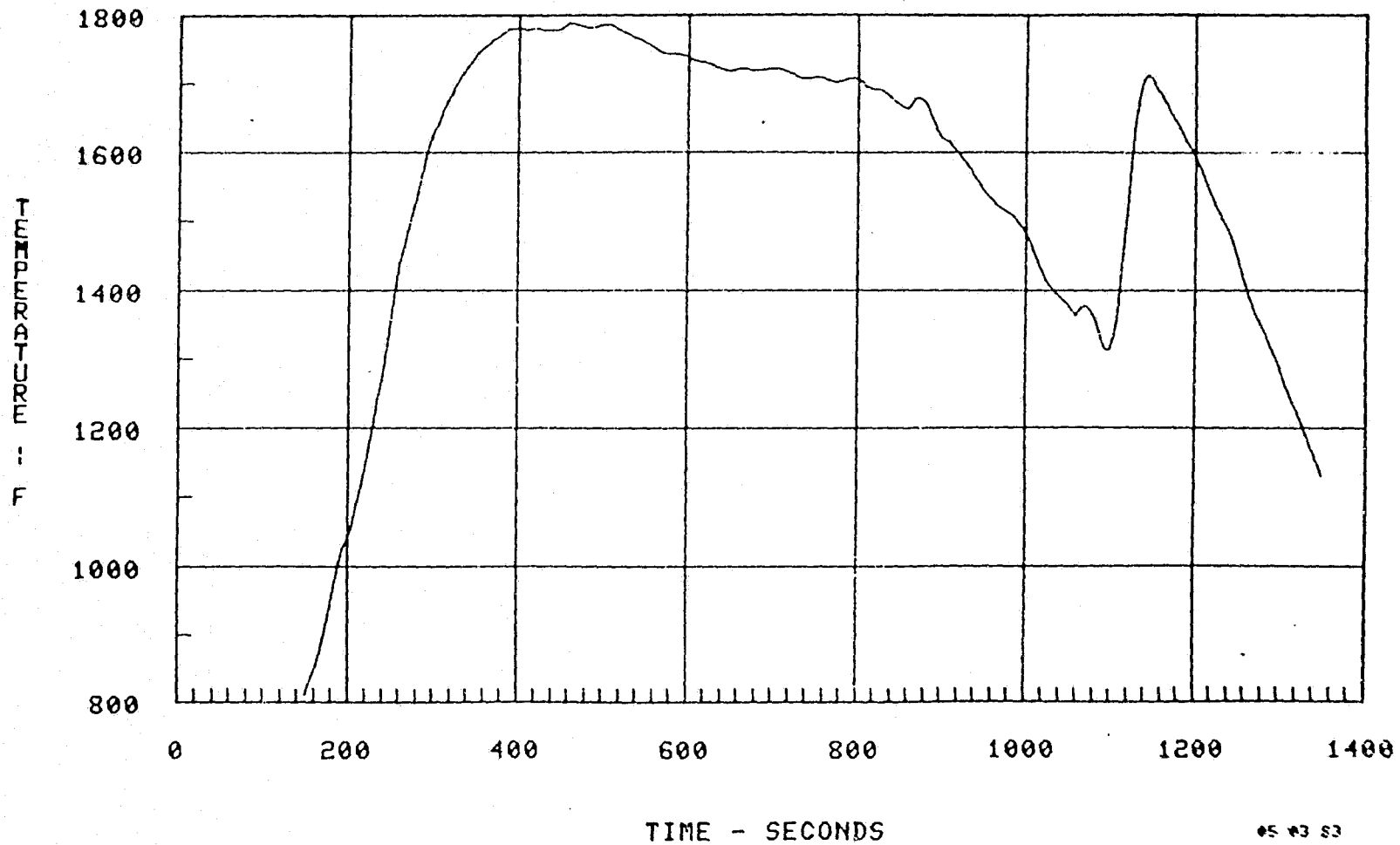


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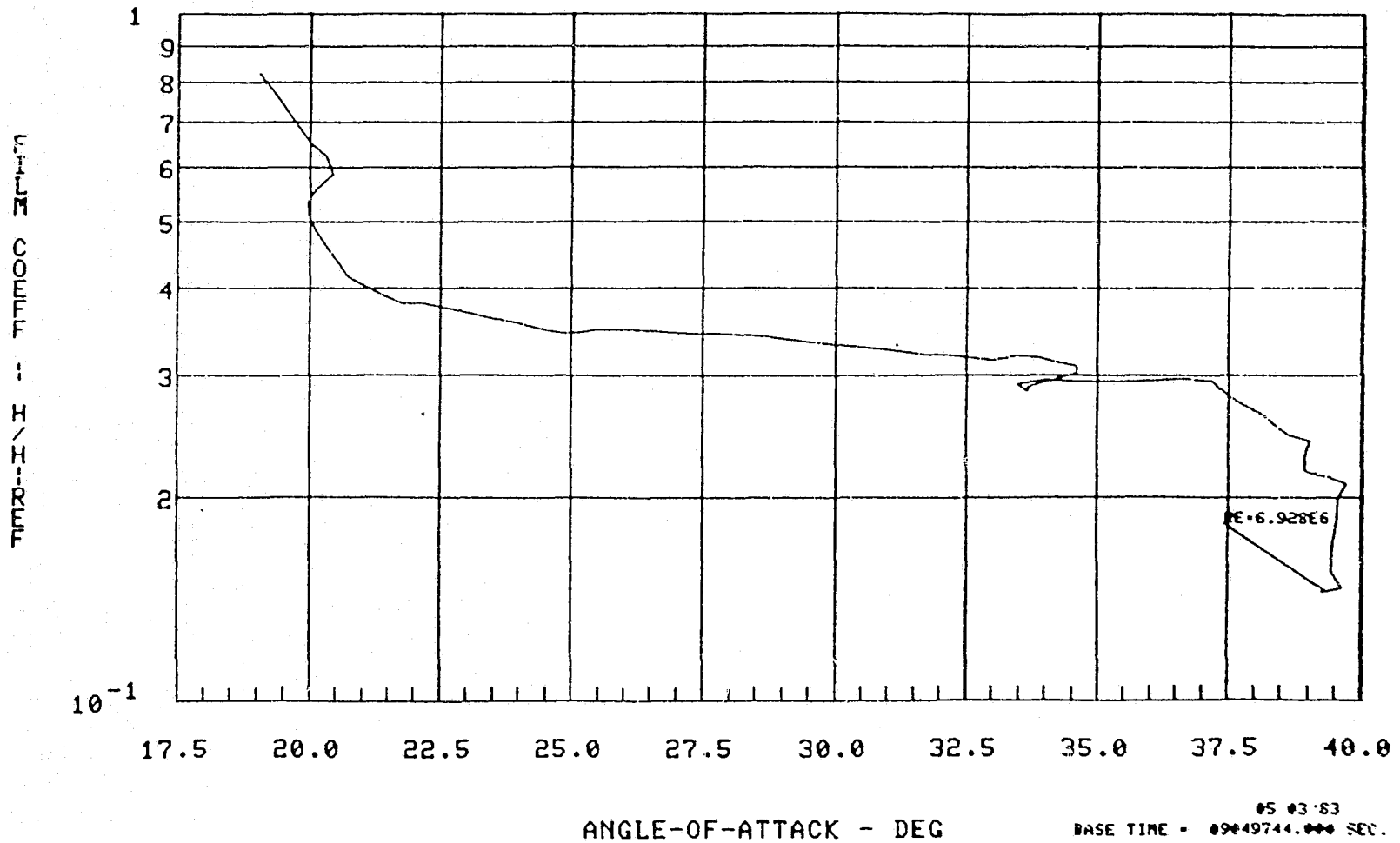
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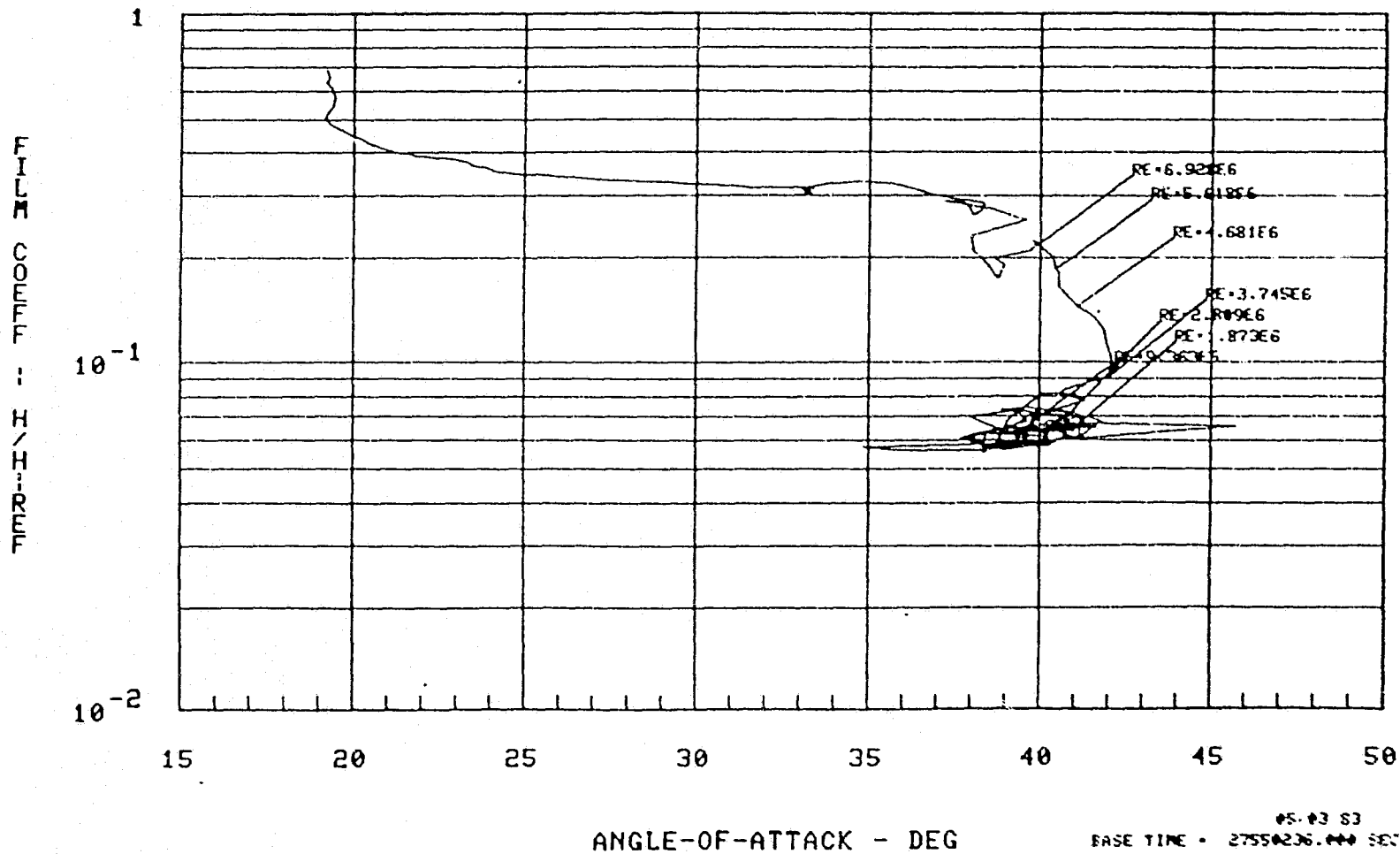


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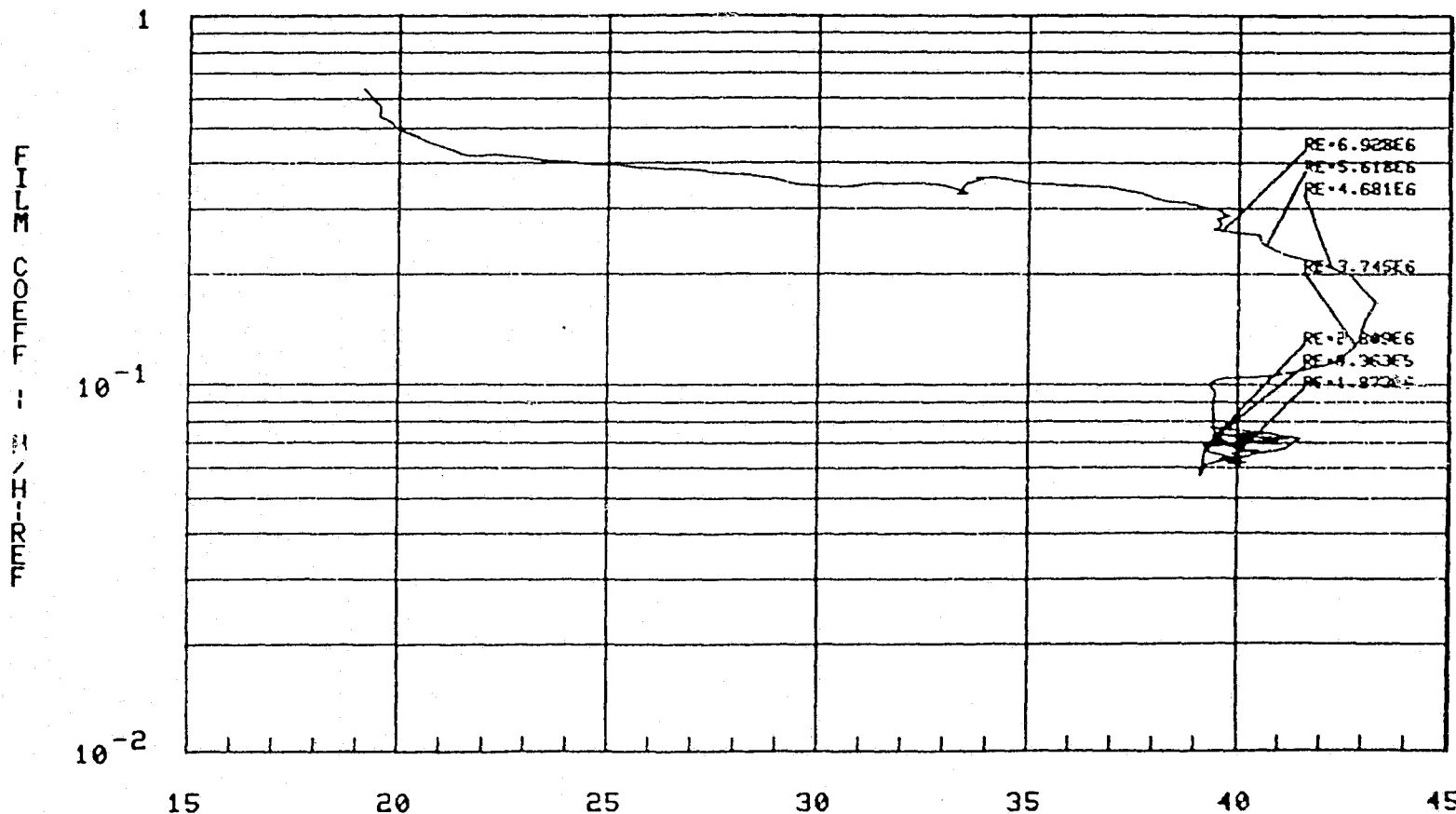
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B-227

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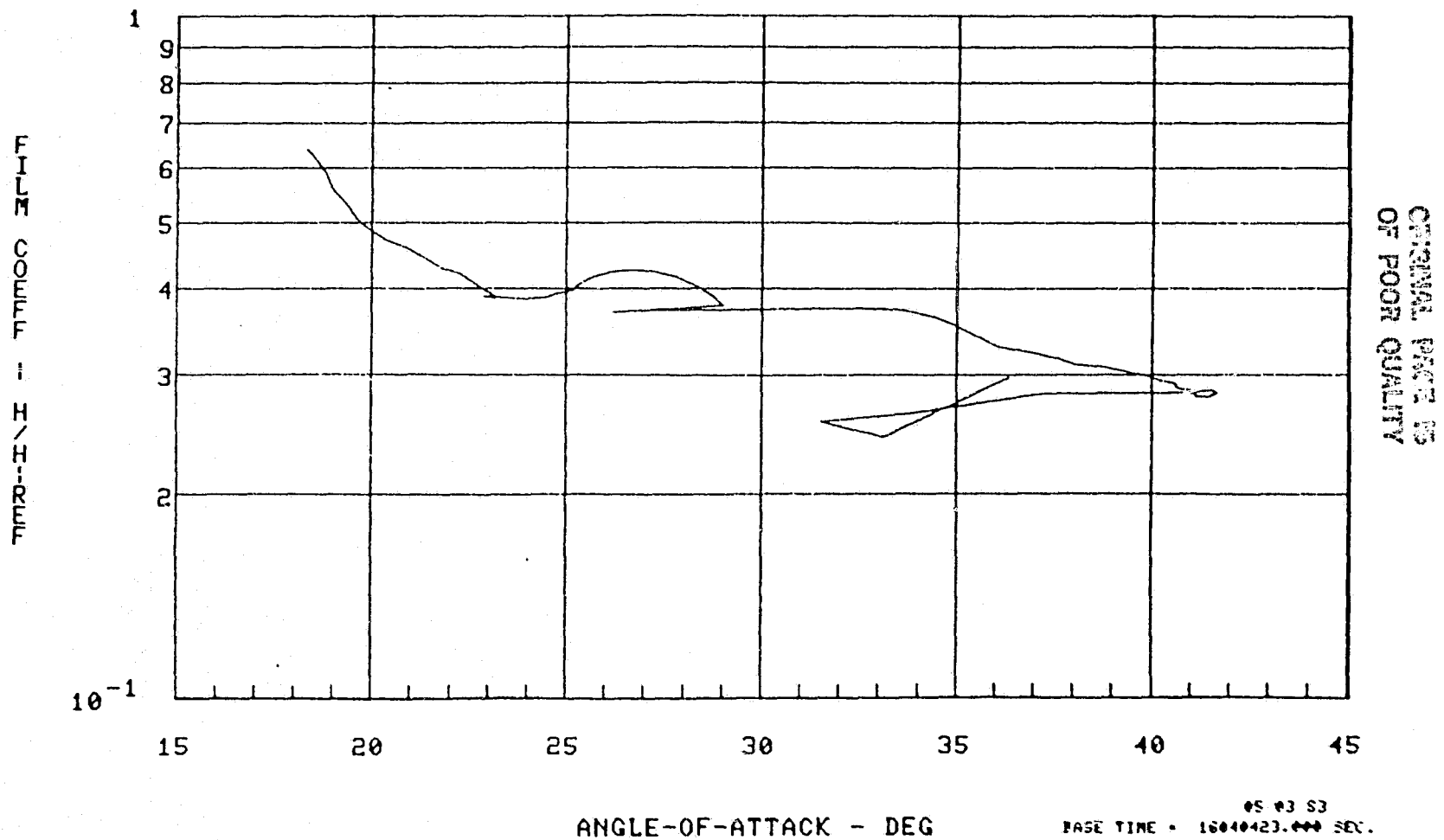
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B-228

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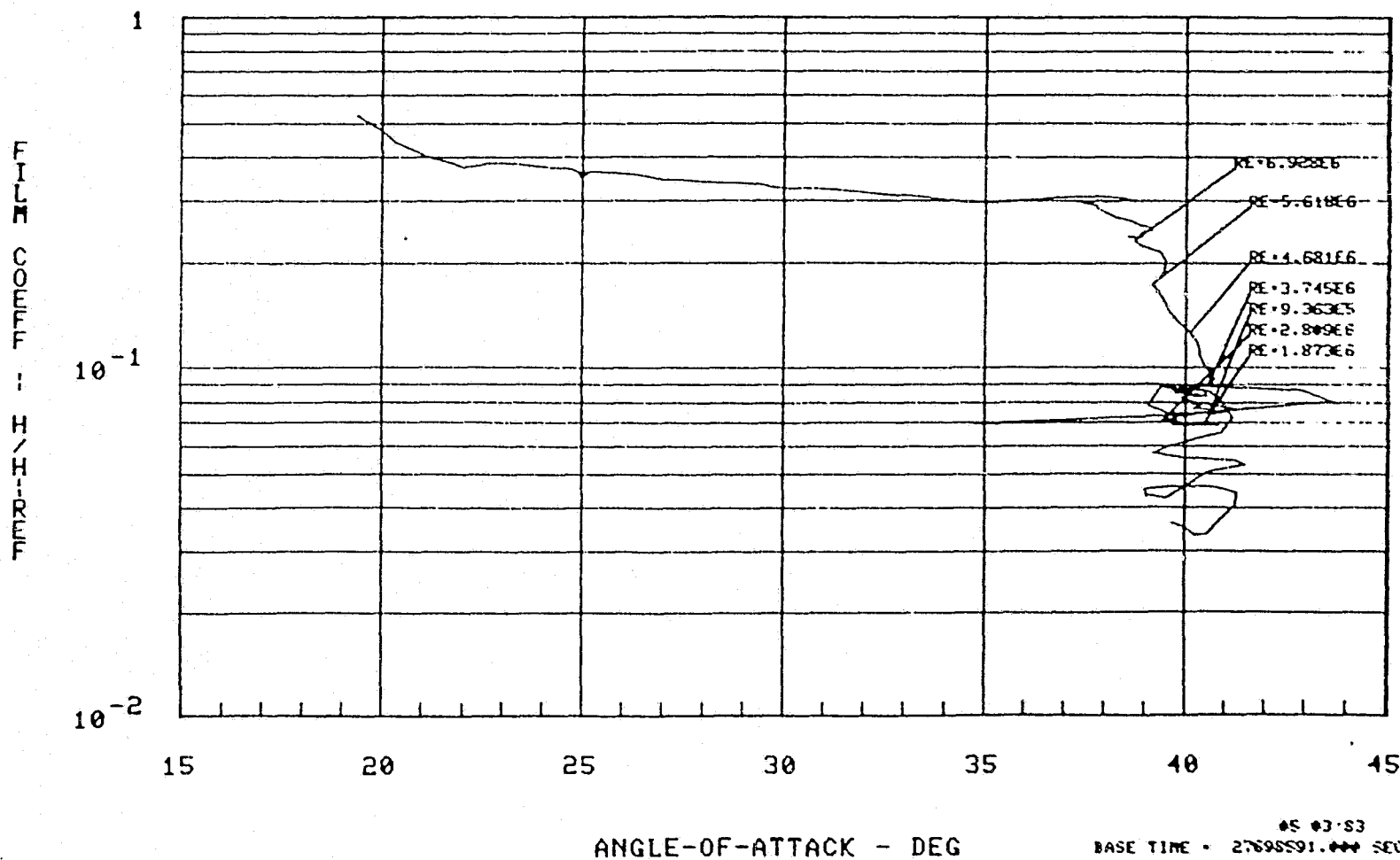
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B-229

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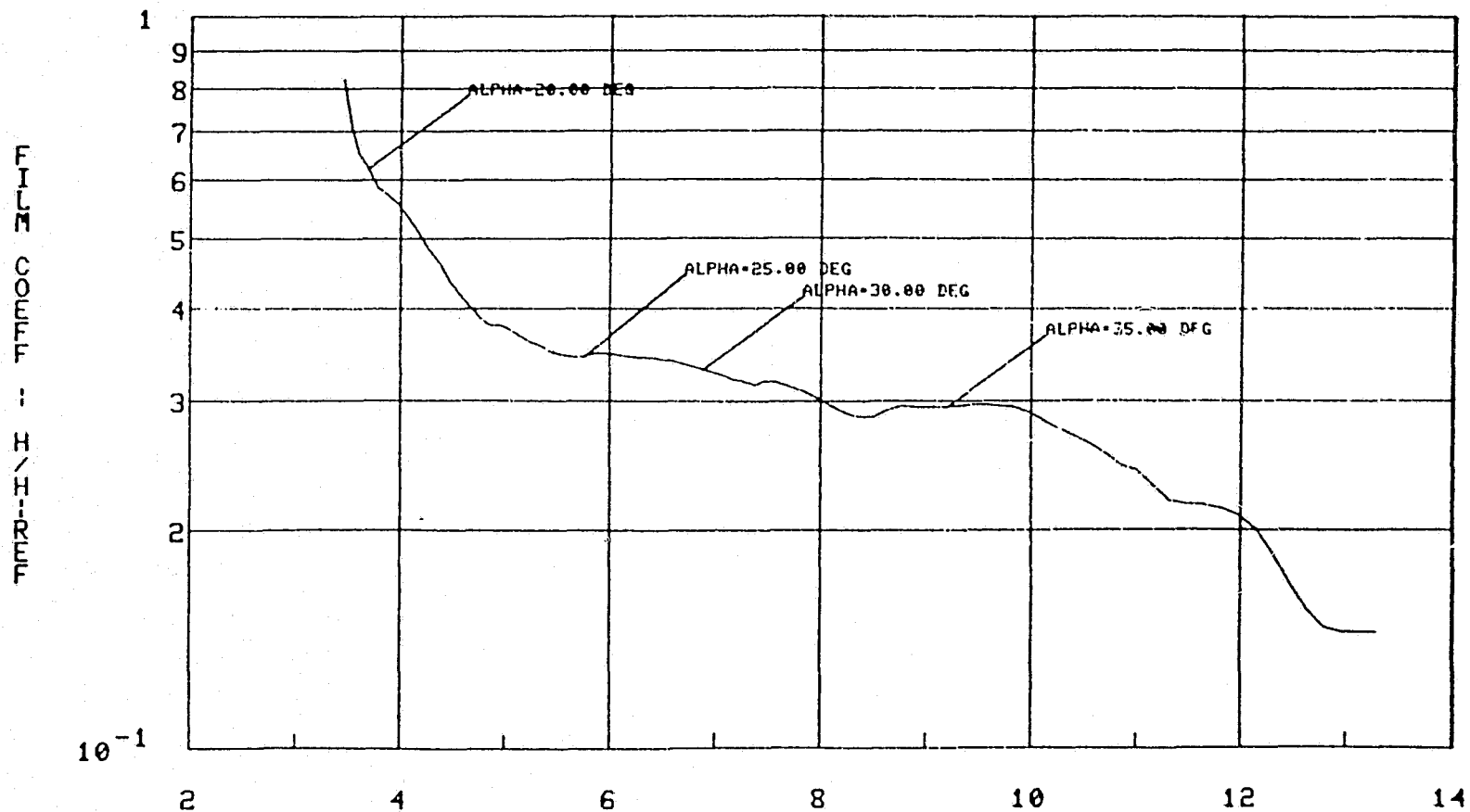


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B-23C

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U09T9231A/H-REF 1065-1460 SEC



B-231

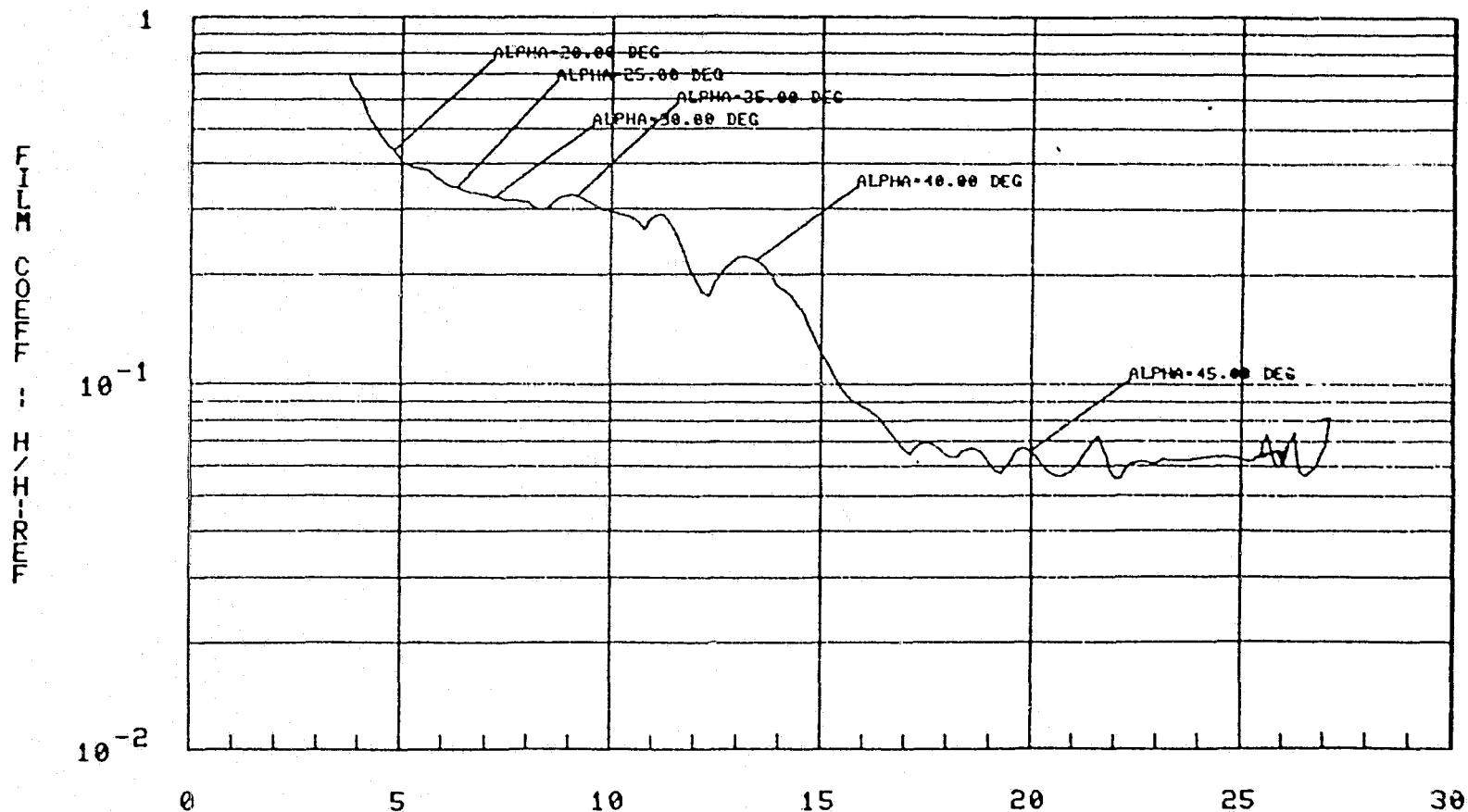
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U09T9231A/H-REF 200-1480 SEC



B-232

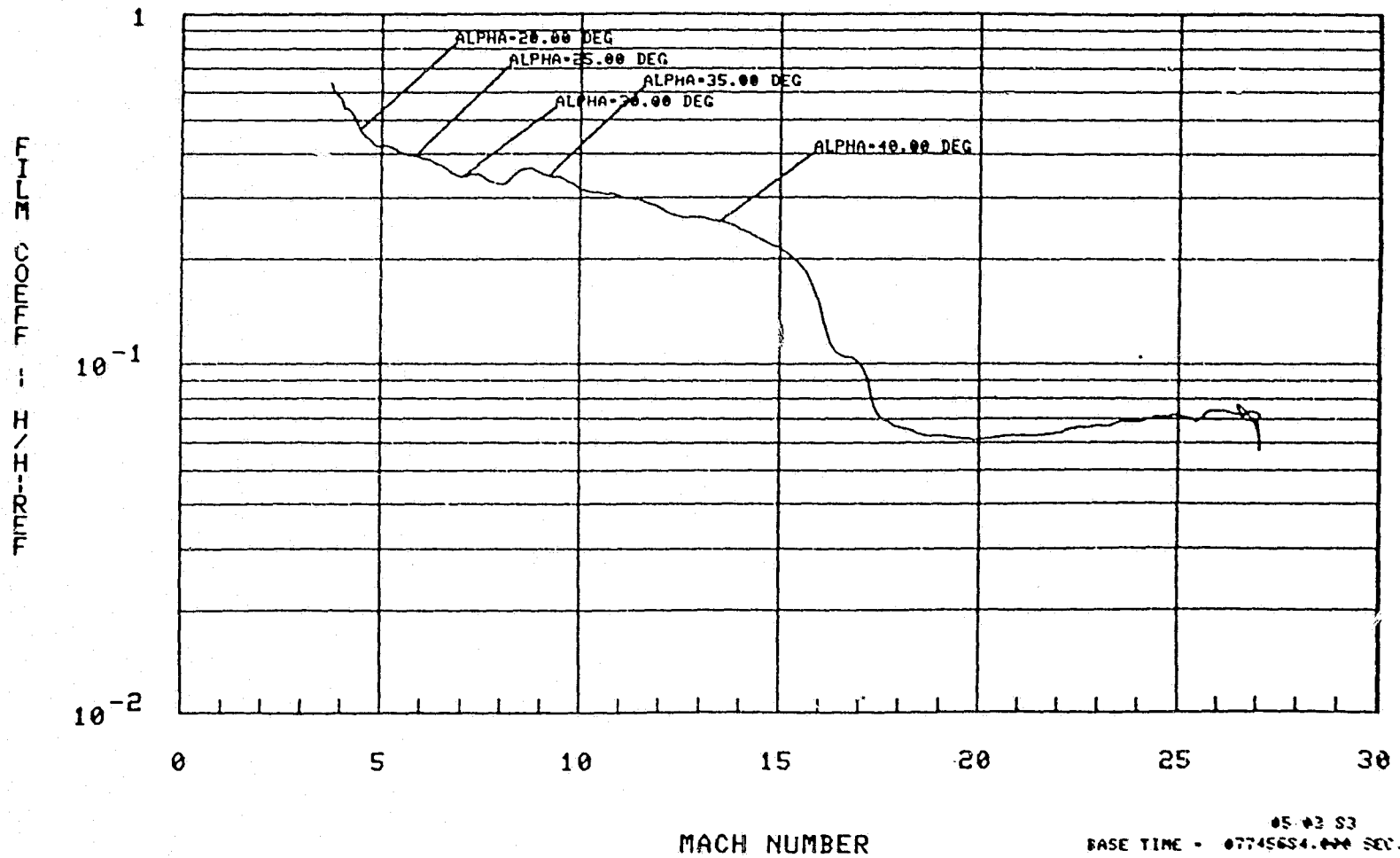
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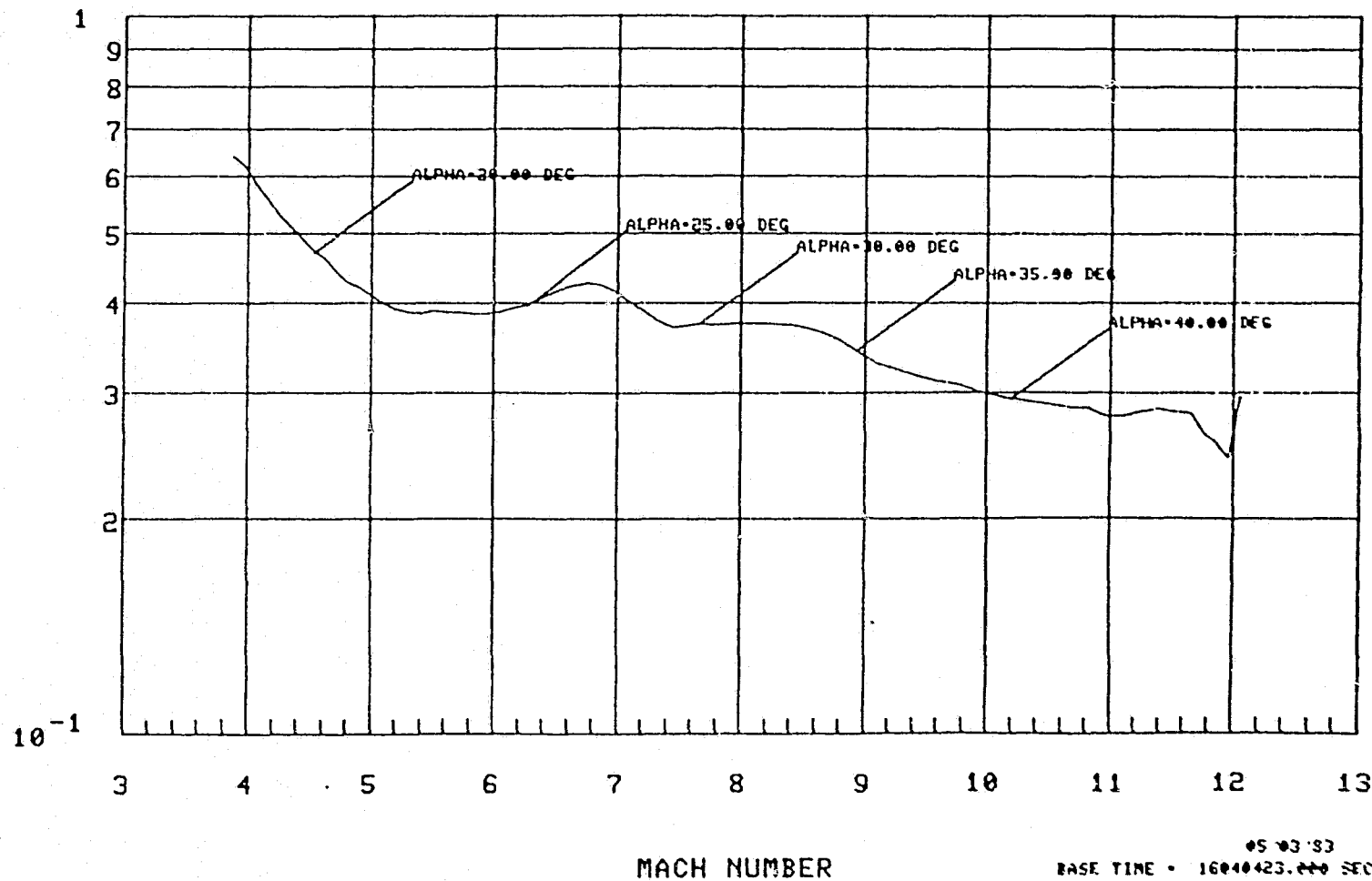
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FILE CODE - H/H-REF

B-234



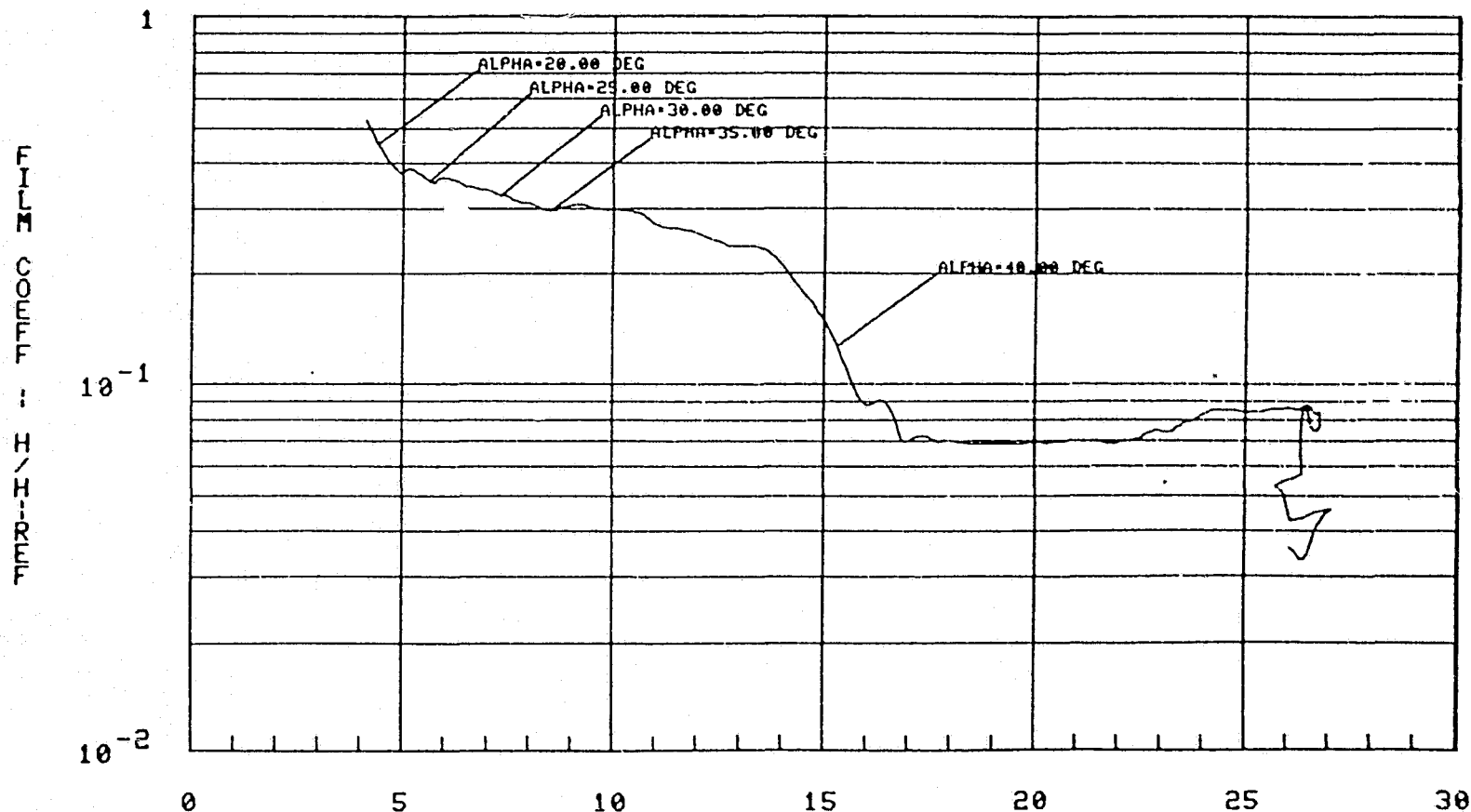
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U09T9231A/H-REF 150-1350 SEC



B-235

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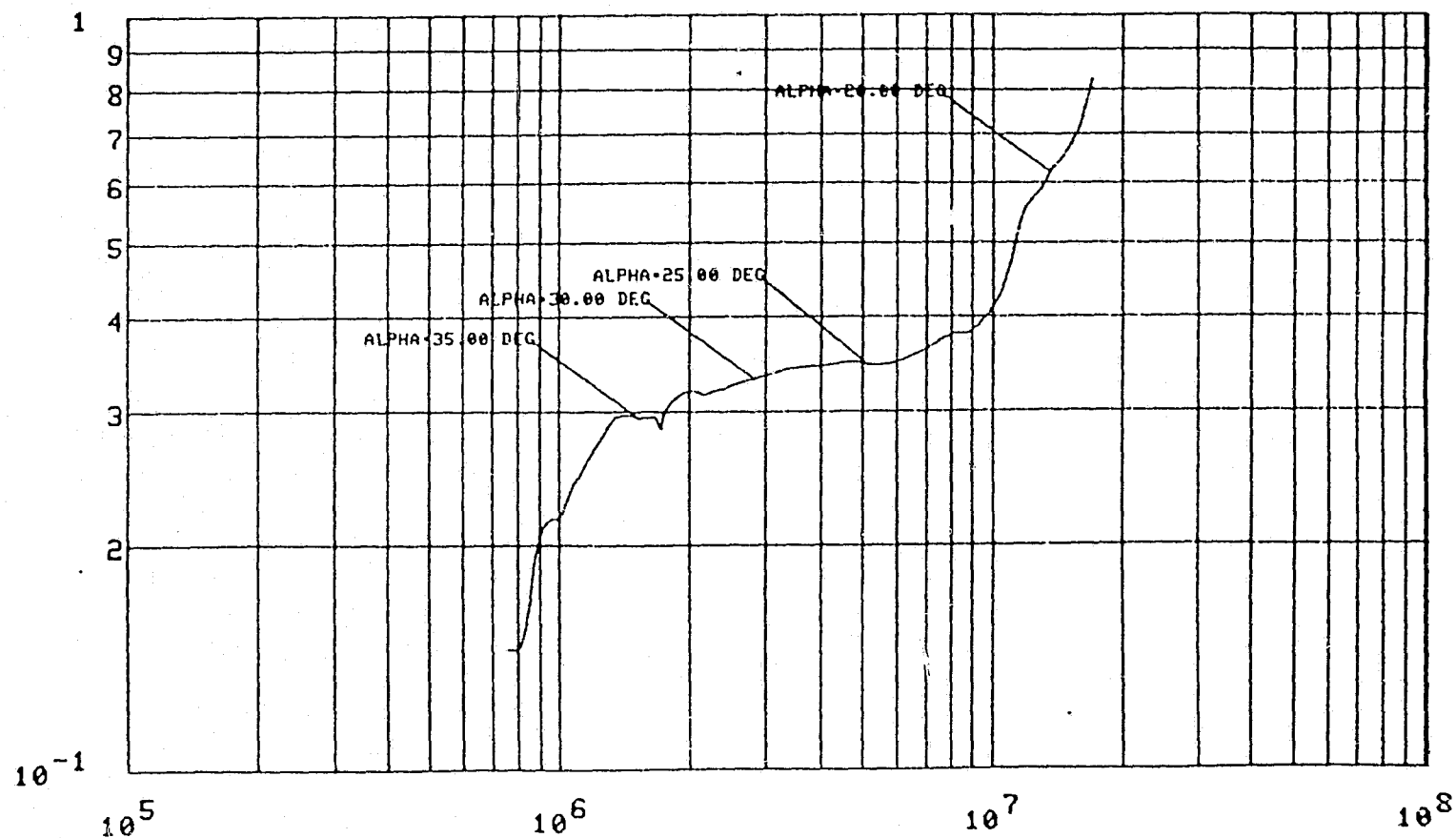
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FILE 000000 - I/I-RUN

B-236



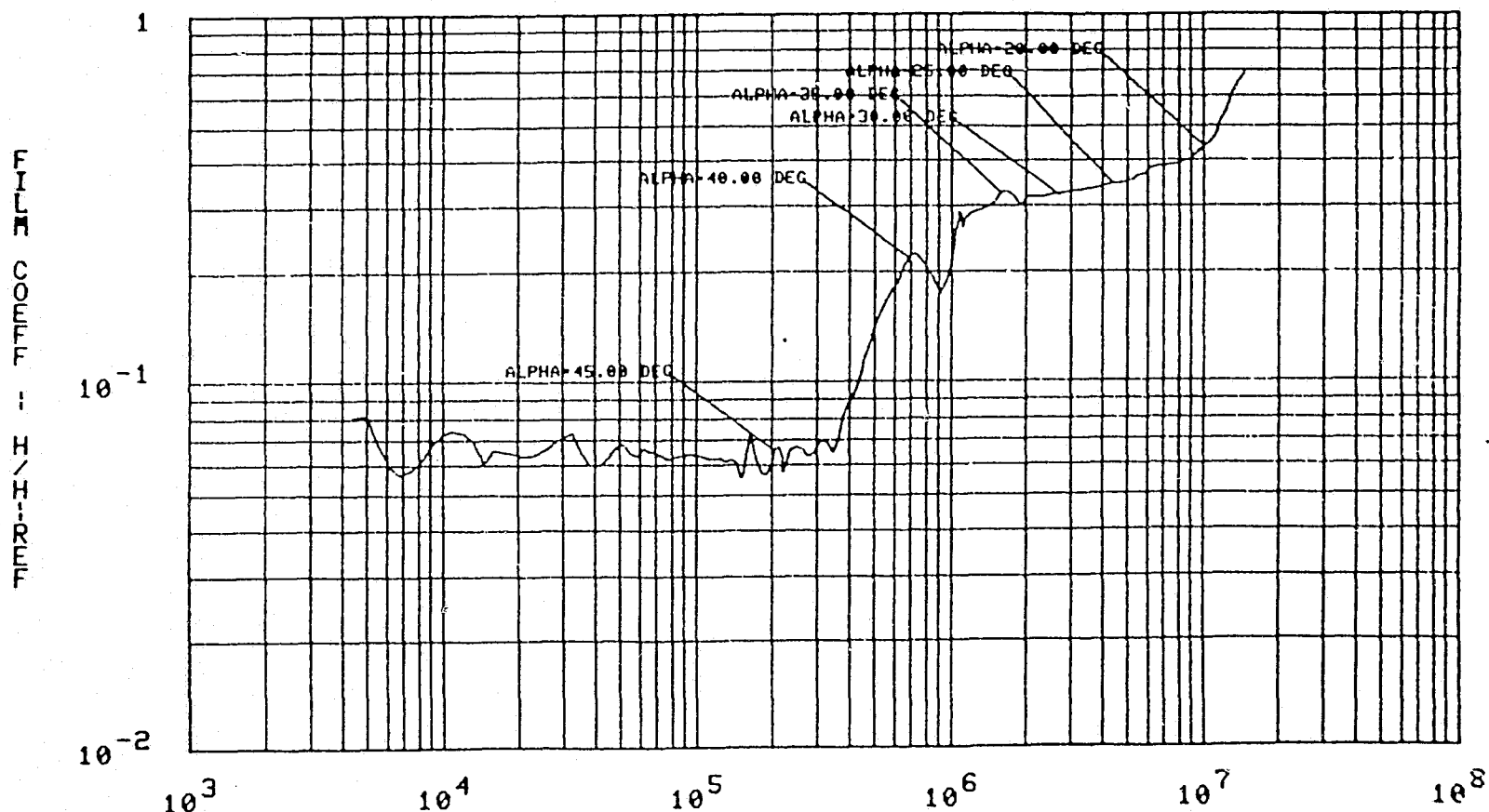
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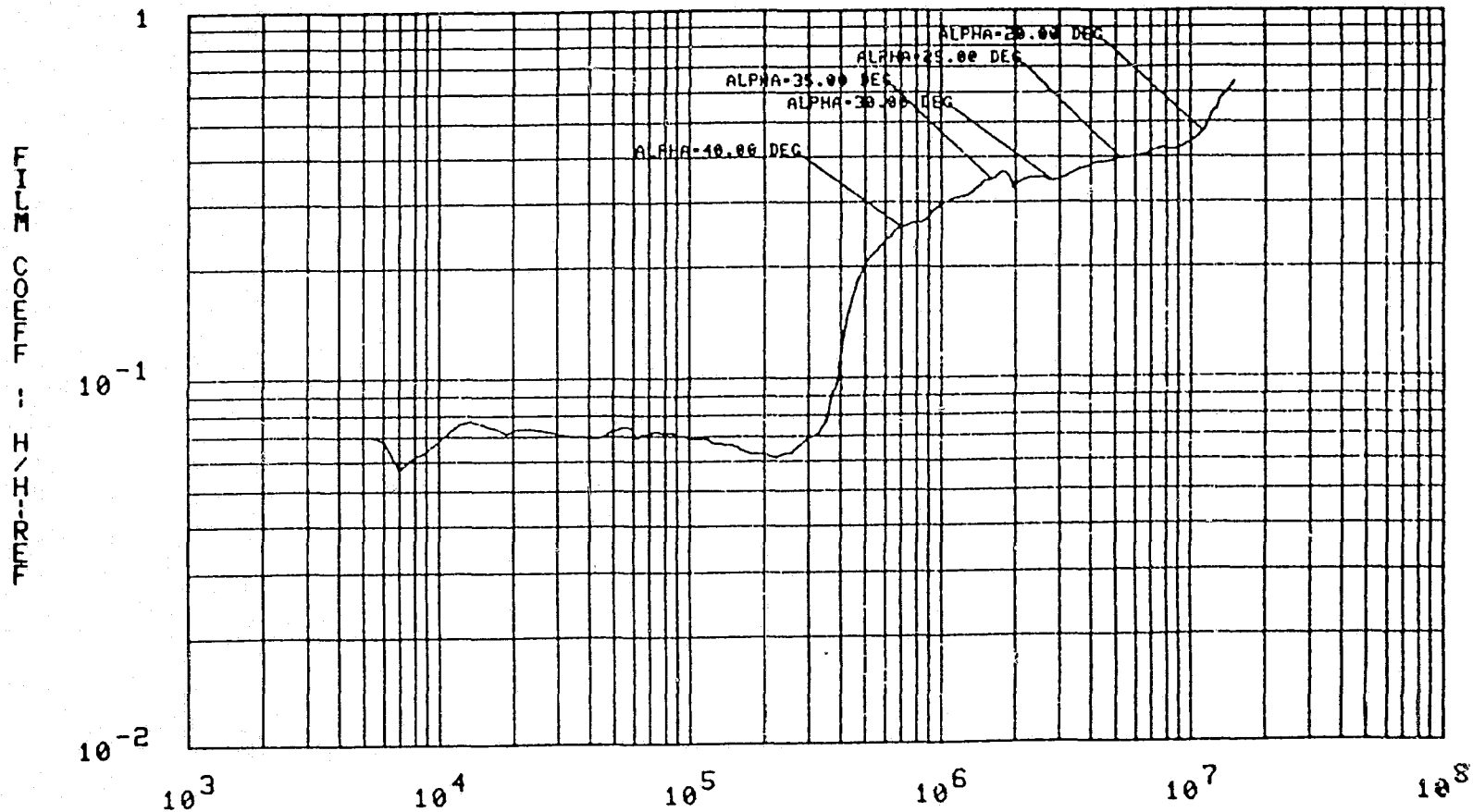
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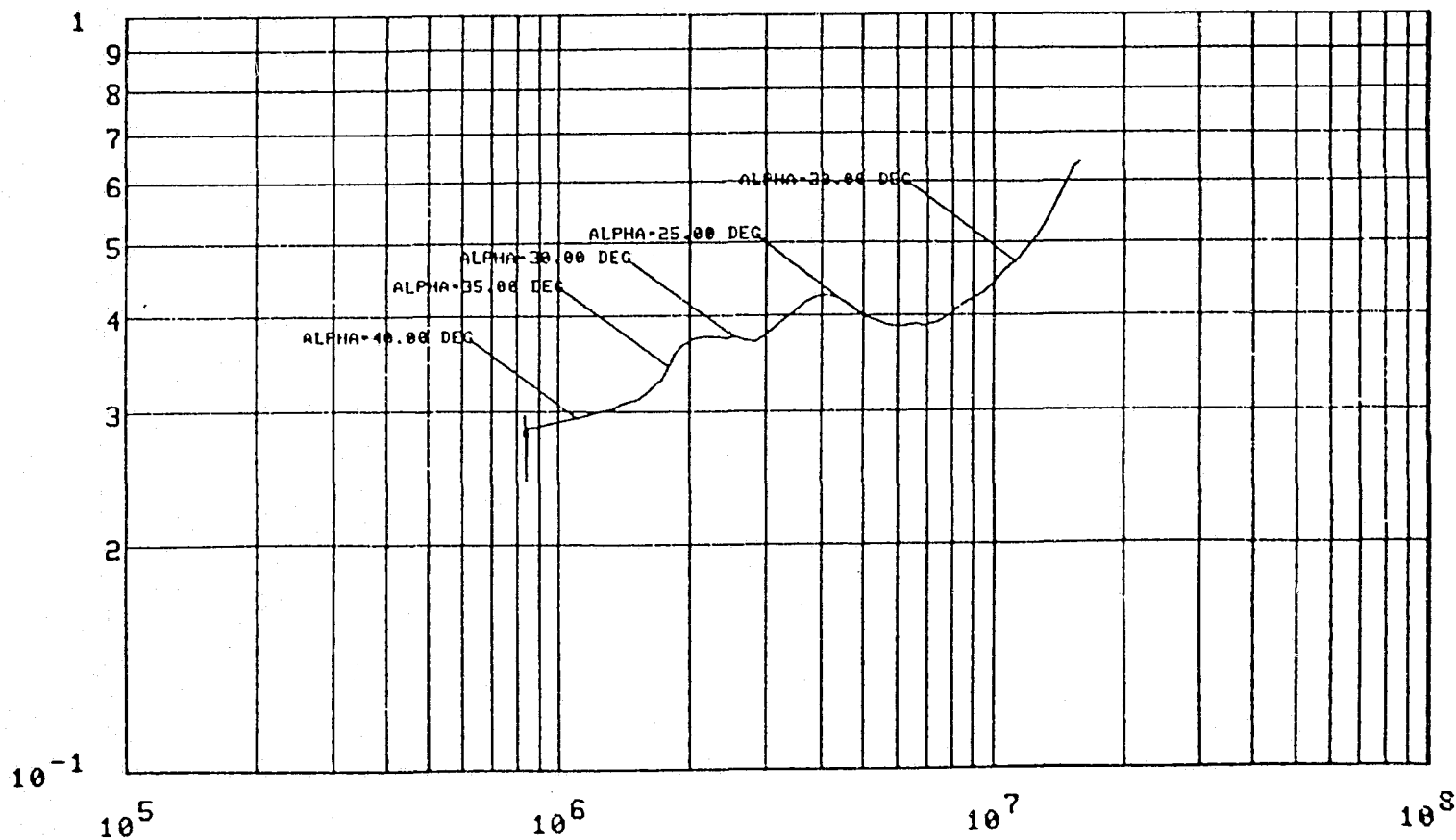
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B-238

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REYNOLDS NUMBER (NS)

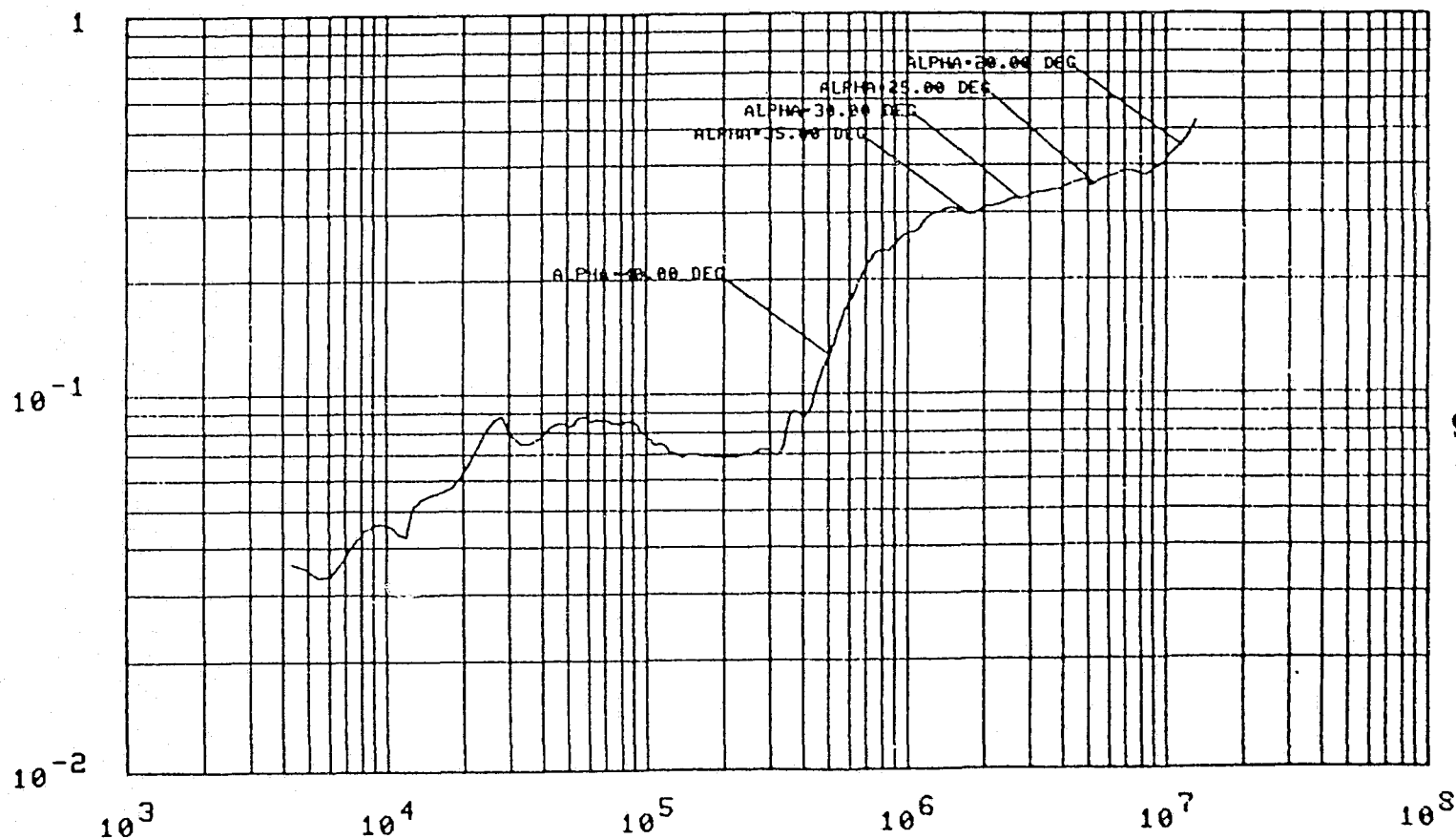
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B-24C



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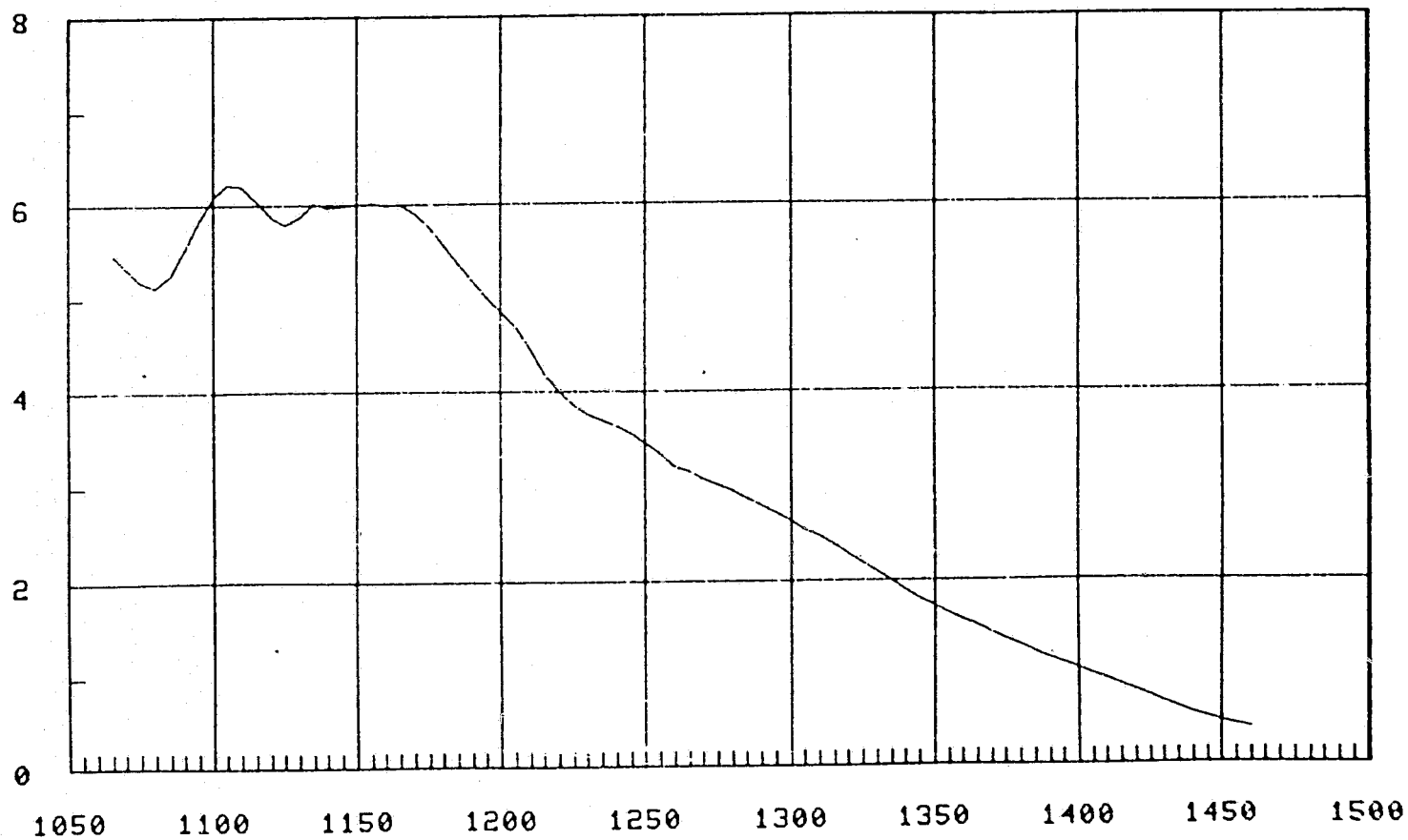
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U09T9231A

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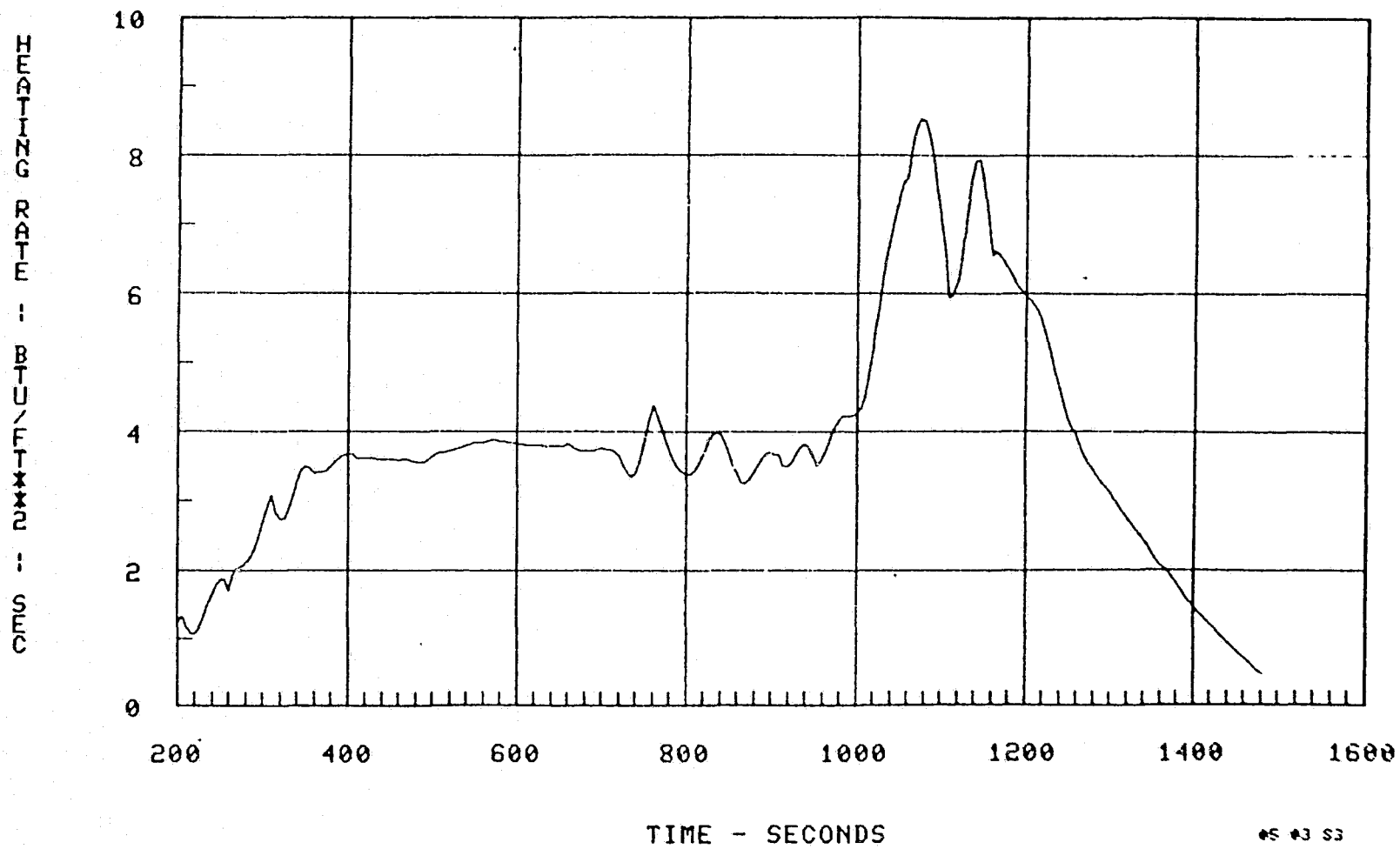
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TIME - SECONDS

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U09T9231A



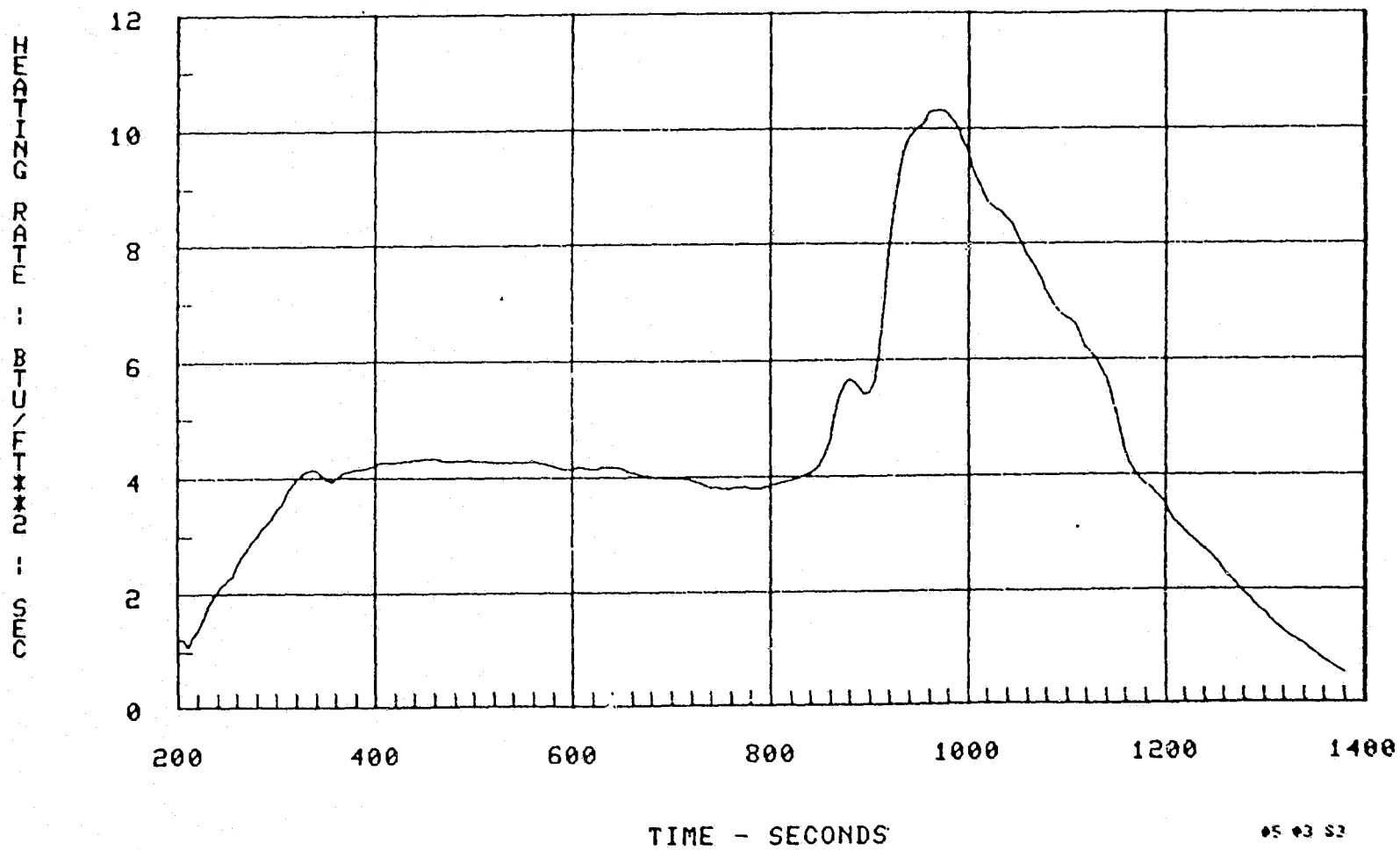
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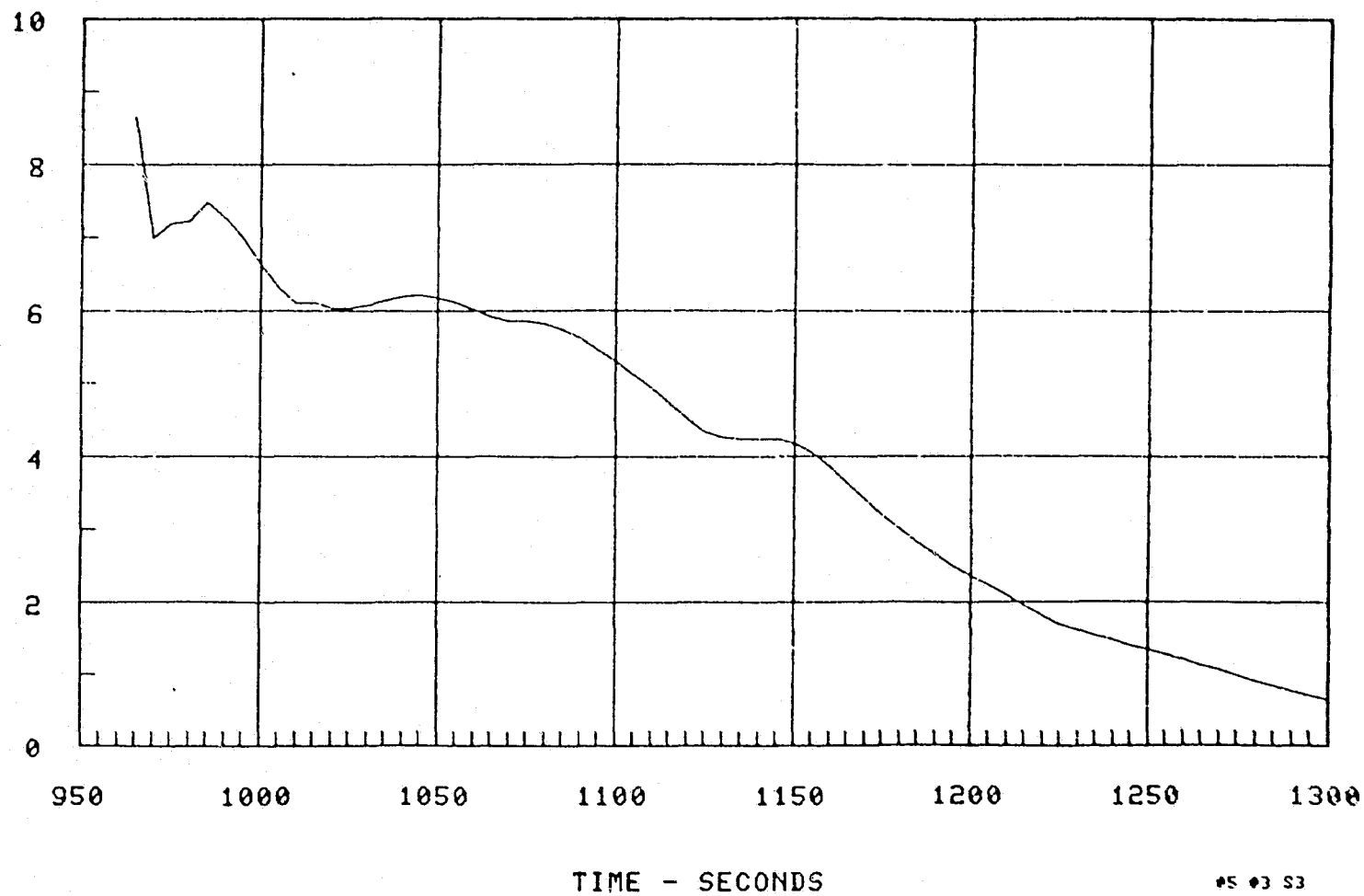
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B-243

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U09T3231A

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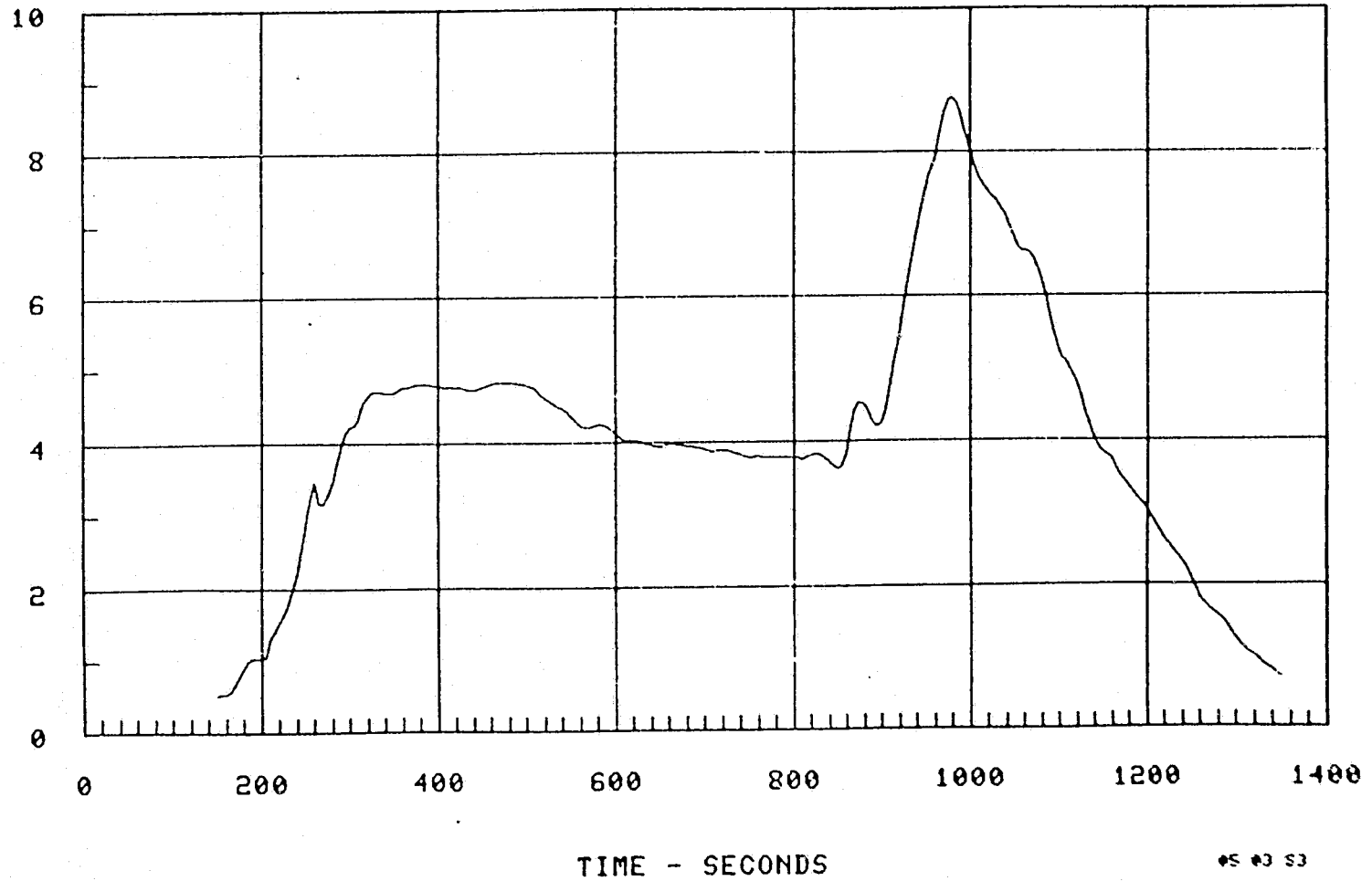
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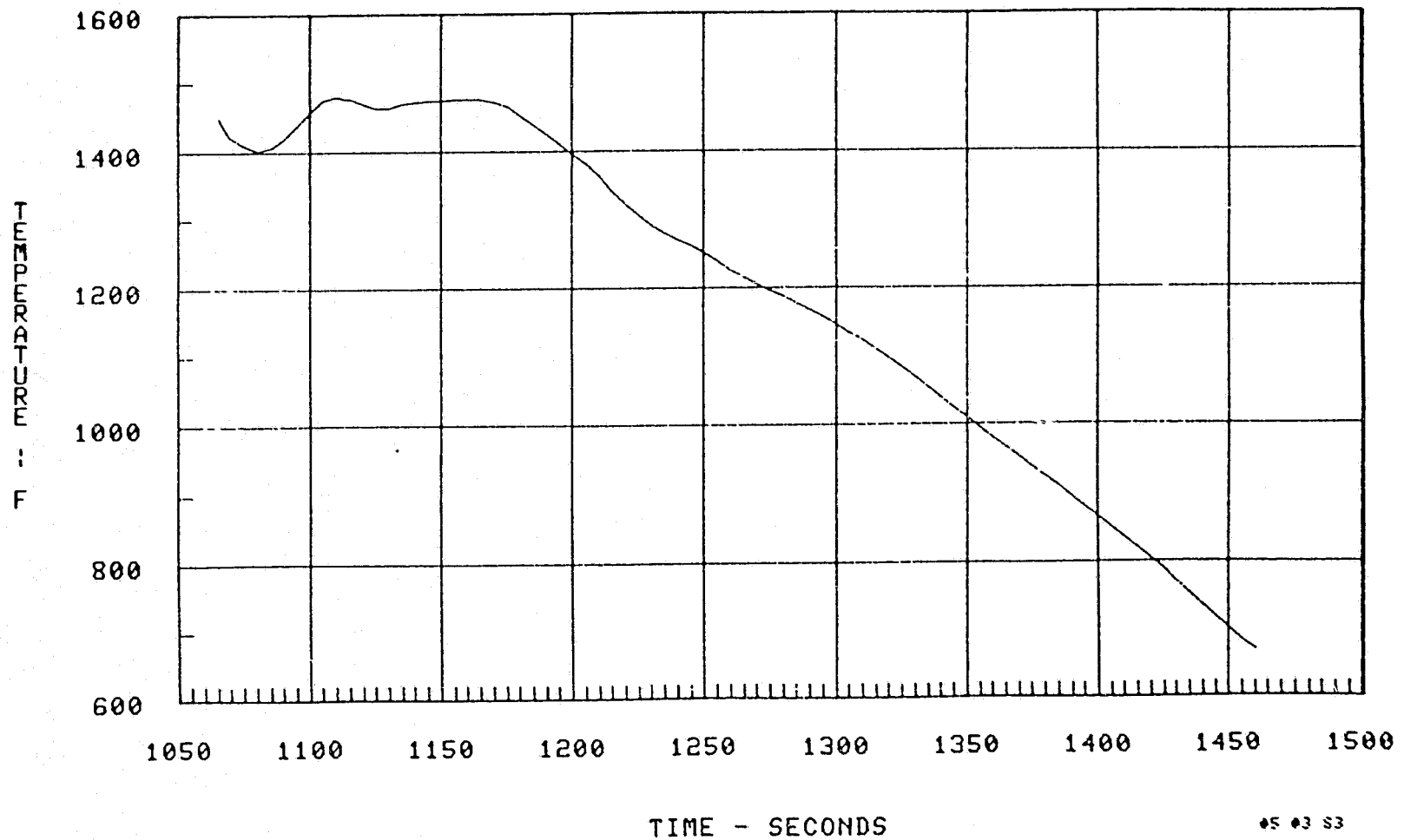
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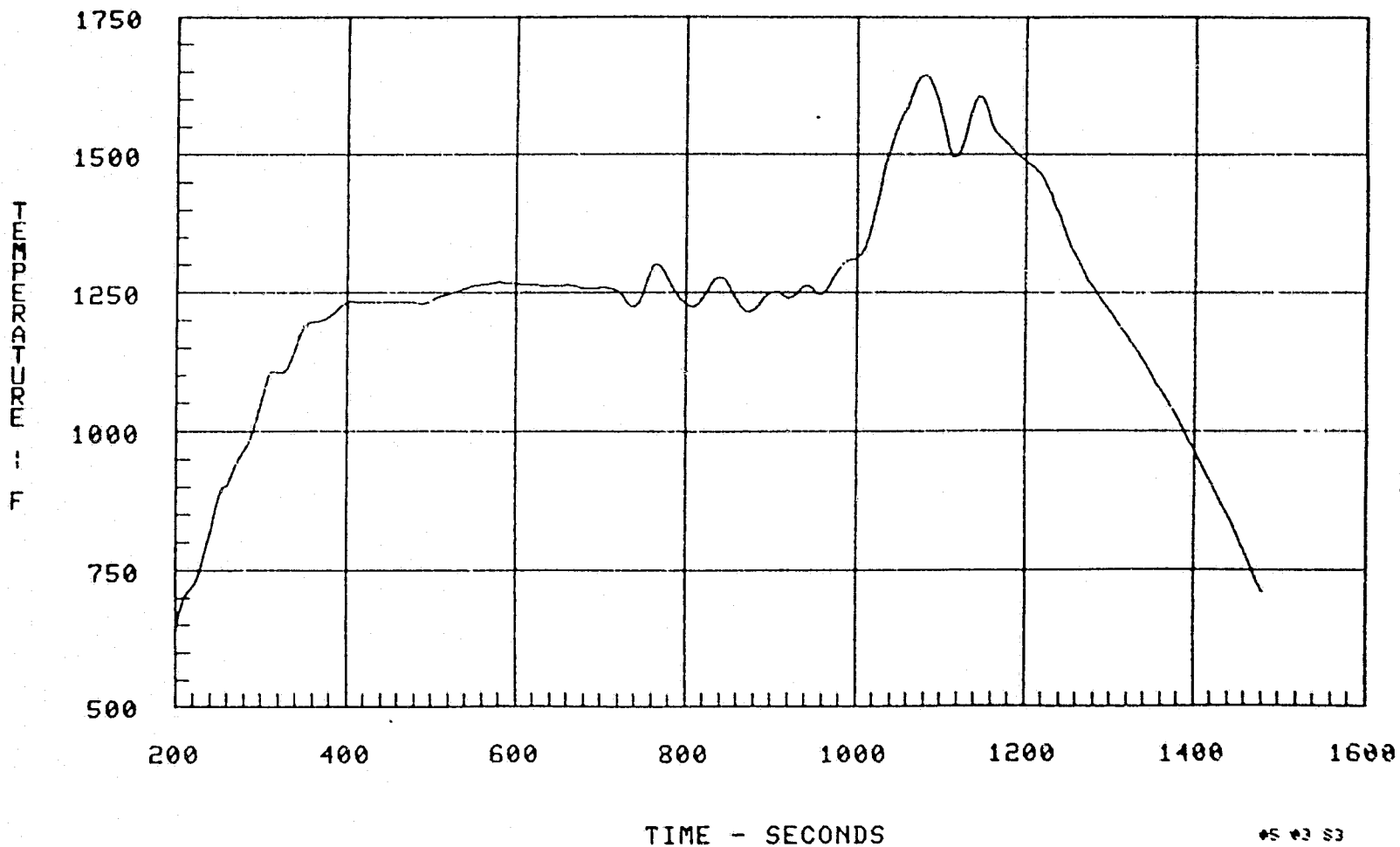
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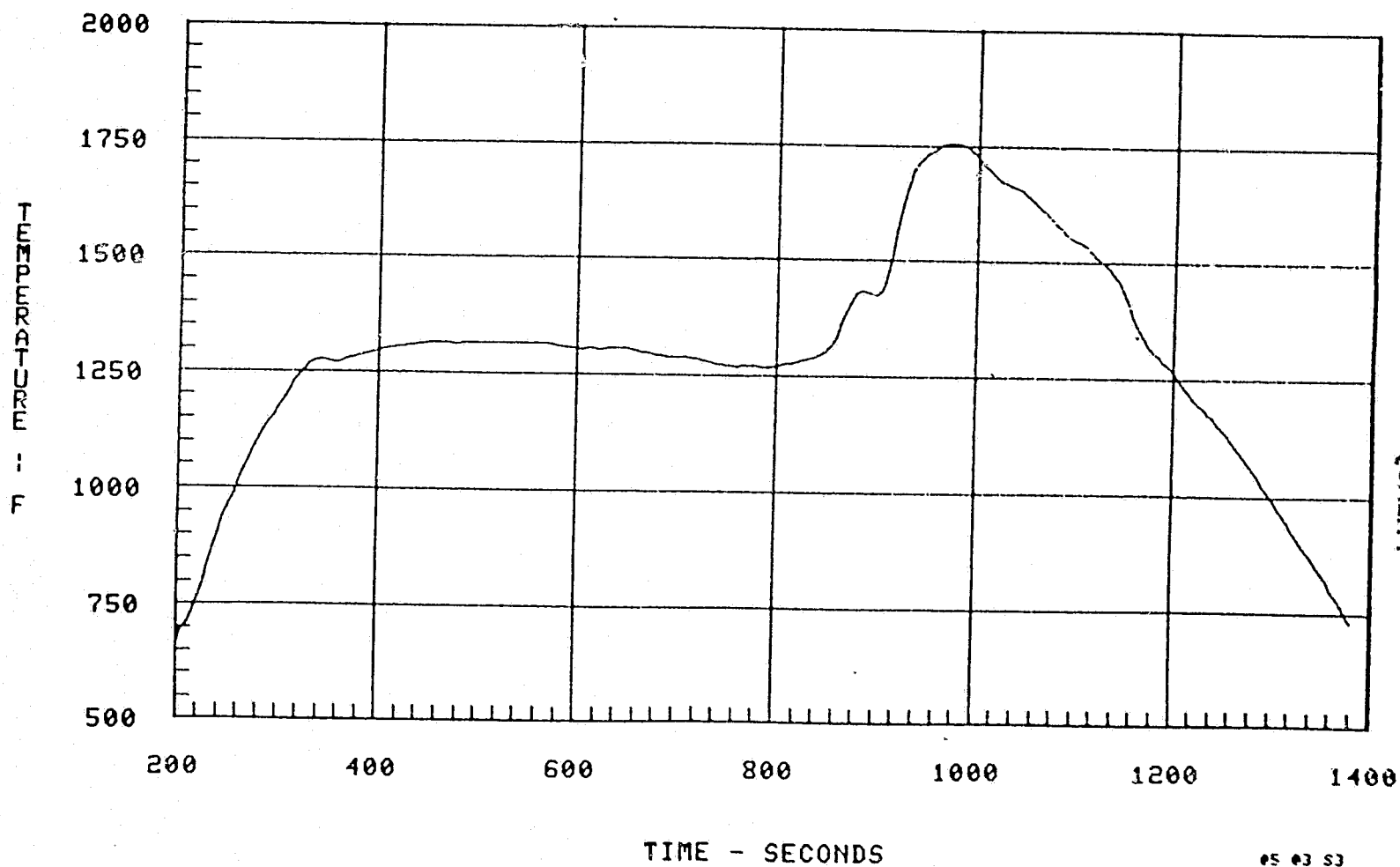


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U09T9231A



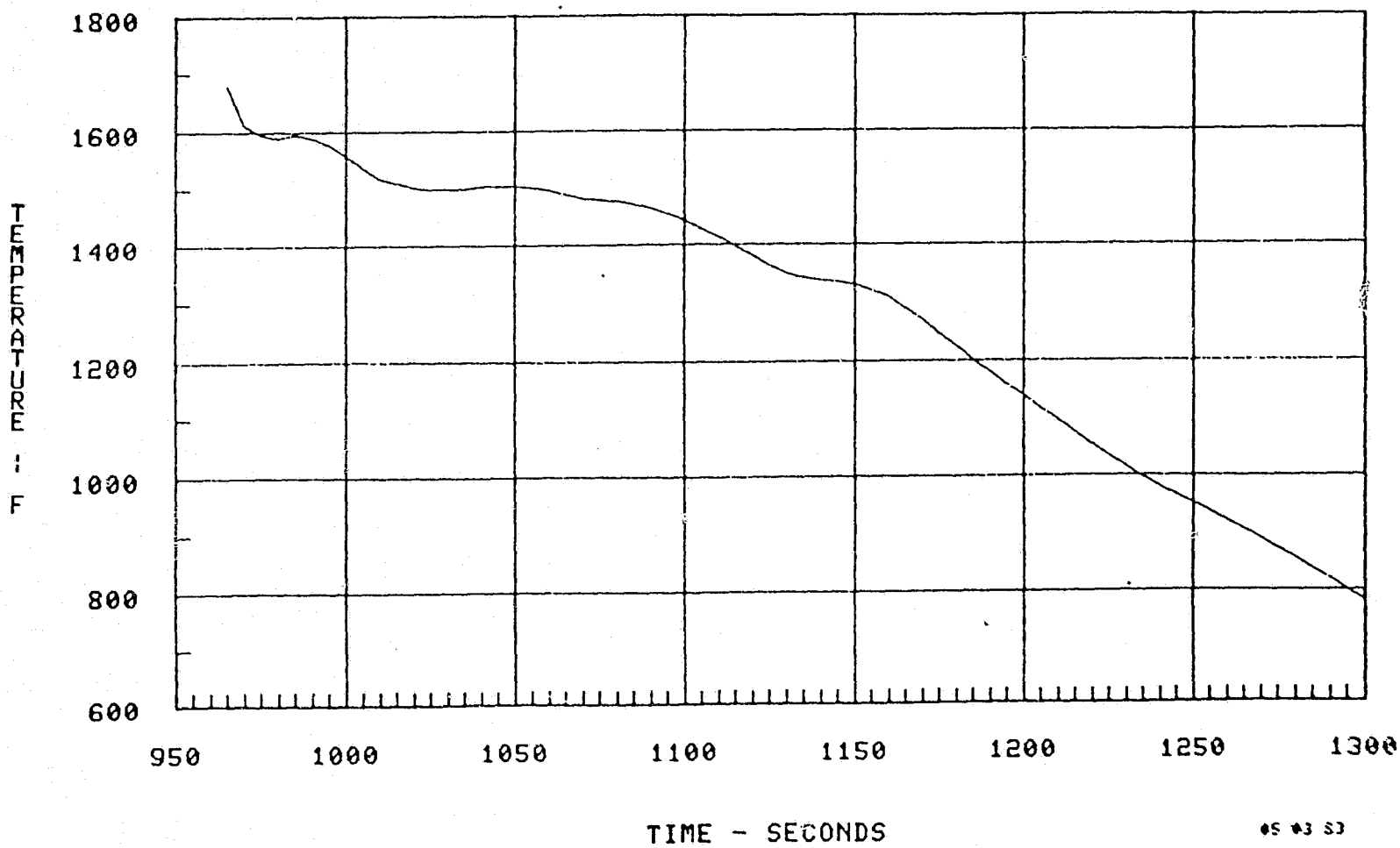
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B-248

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U09T9231A



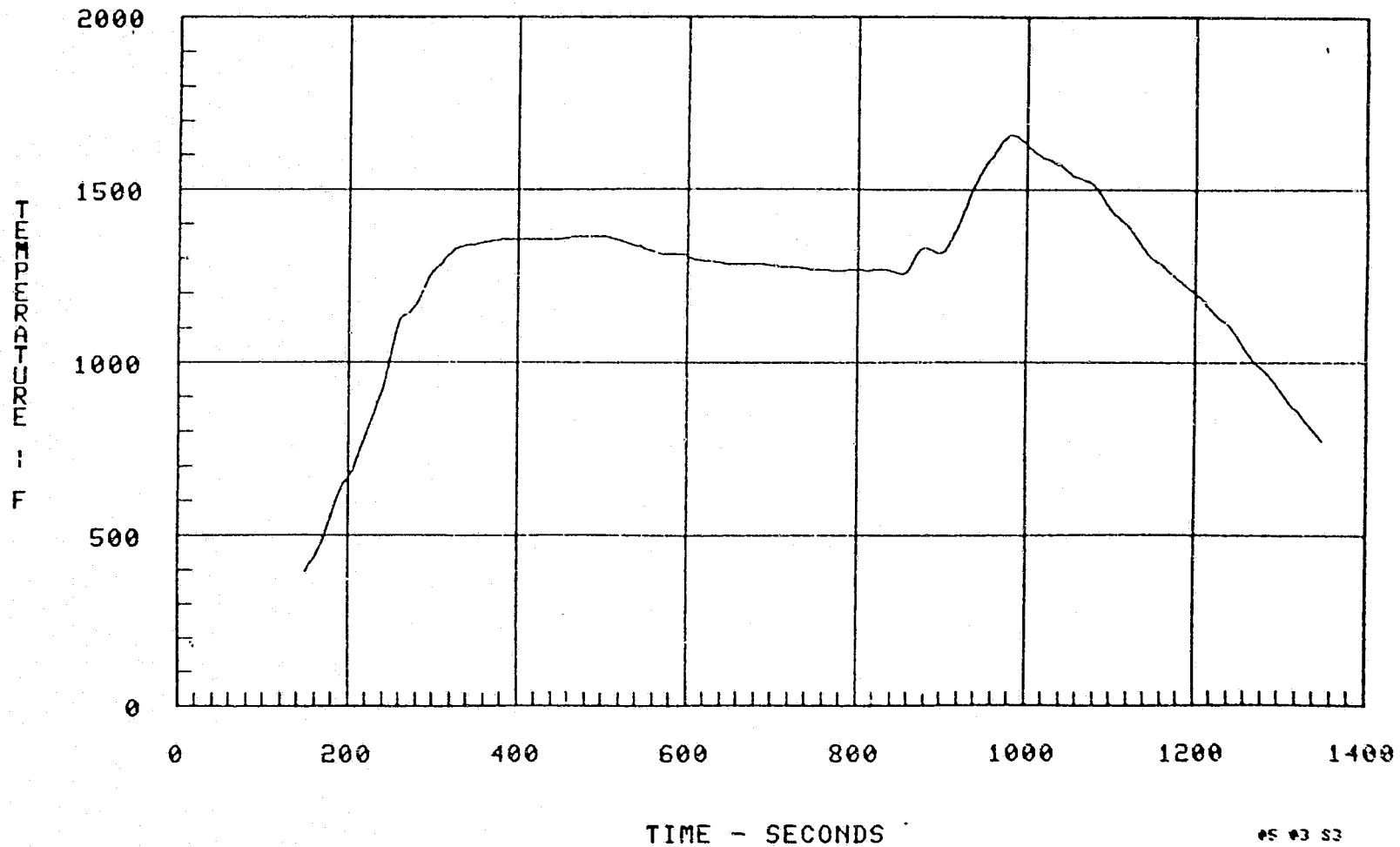
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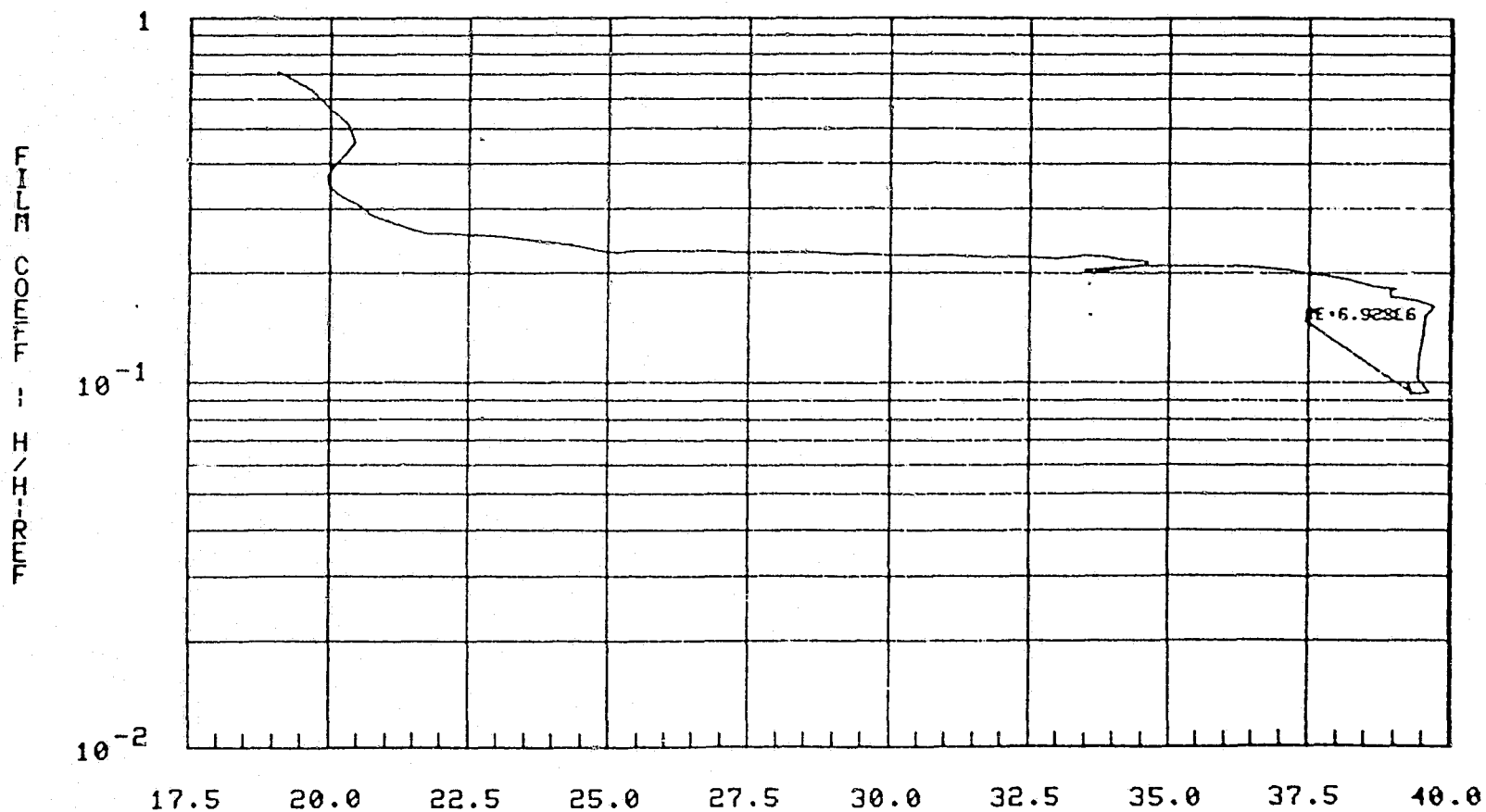
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B-250

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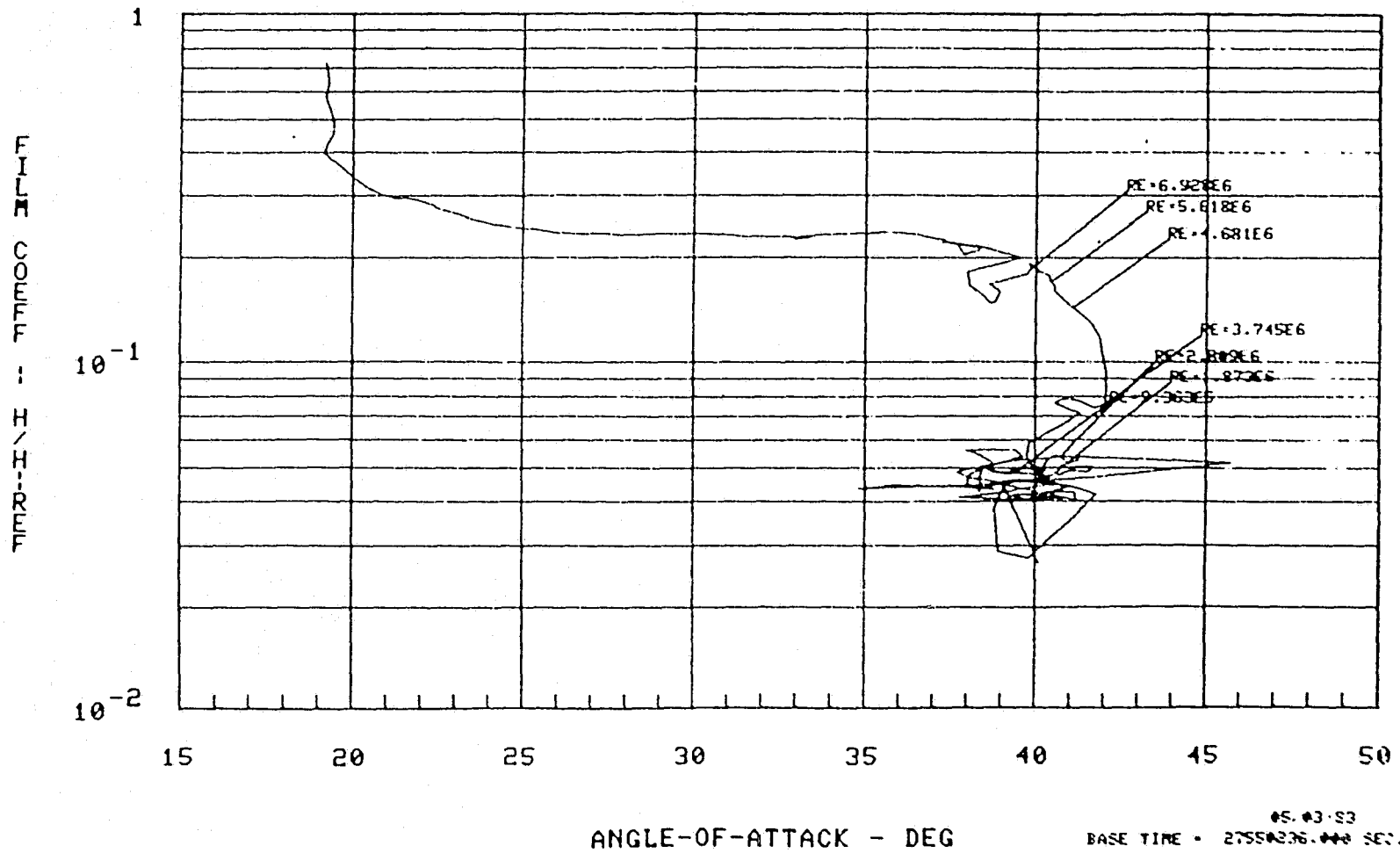
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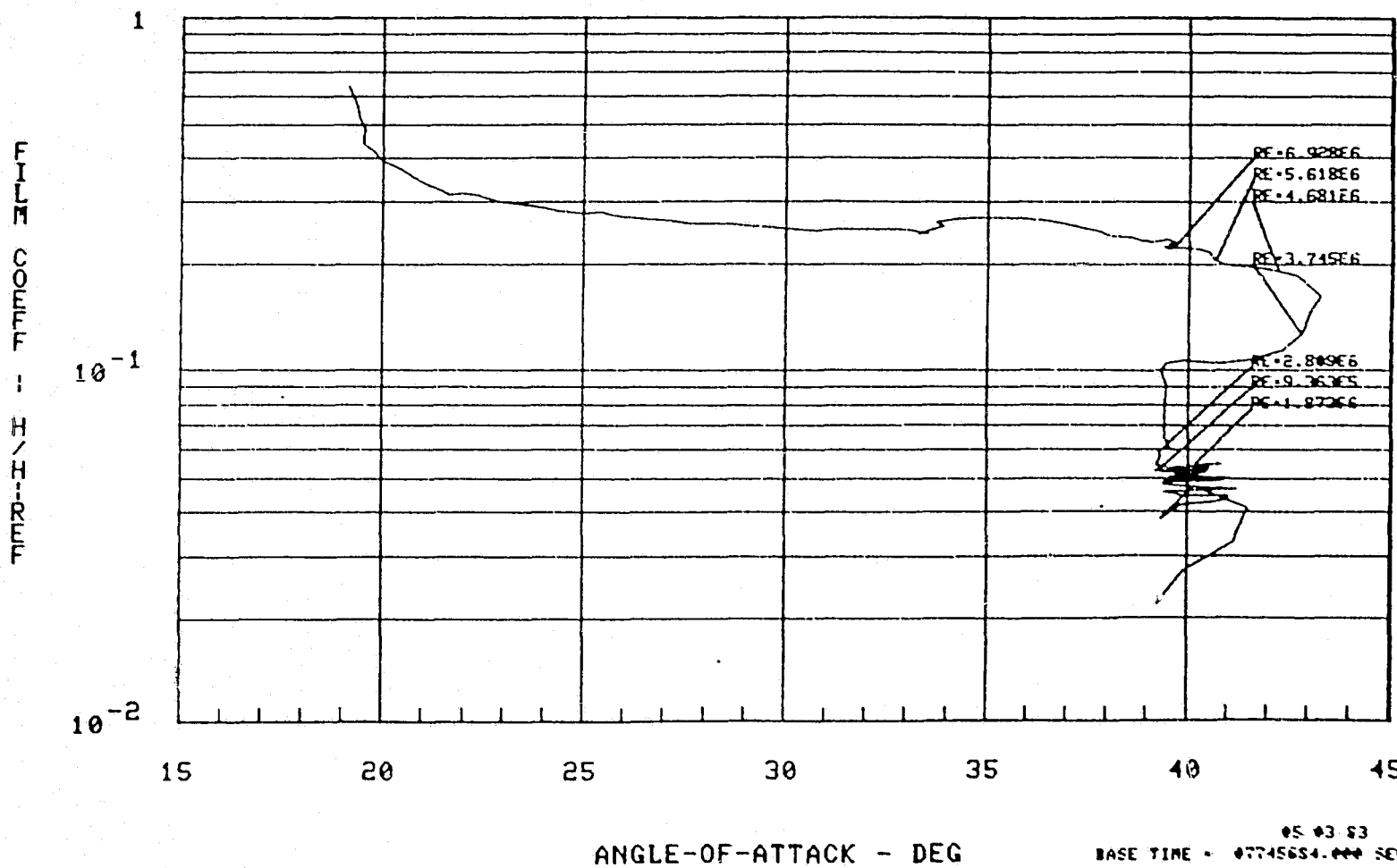


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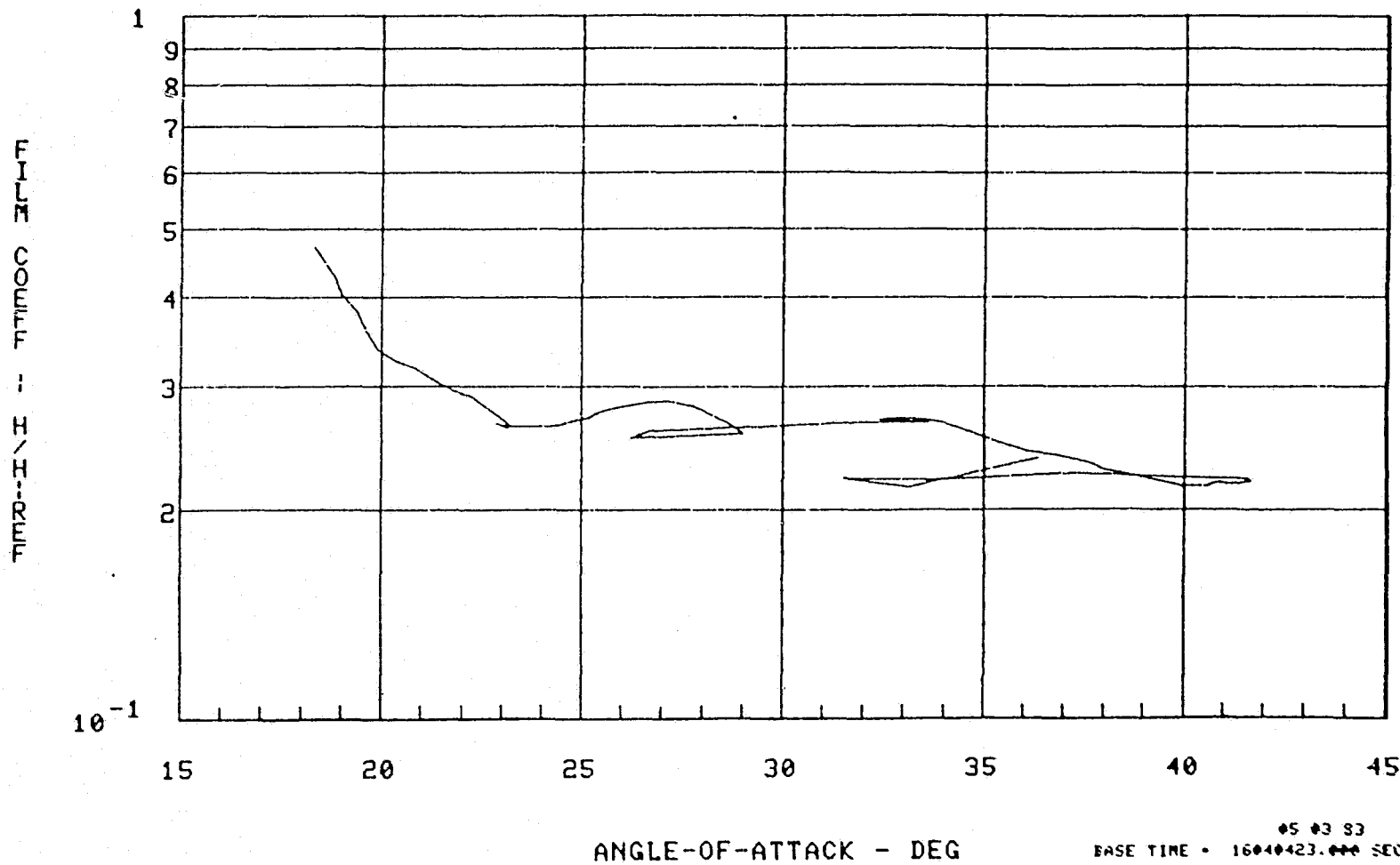
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B-253

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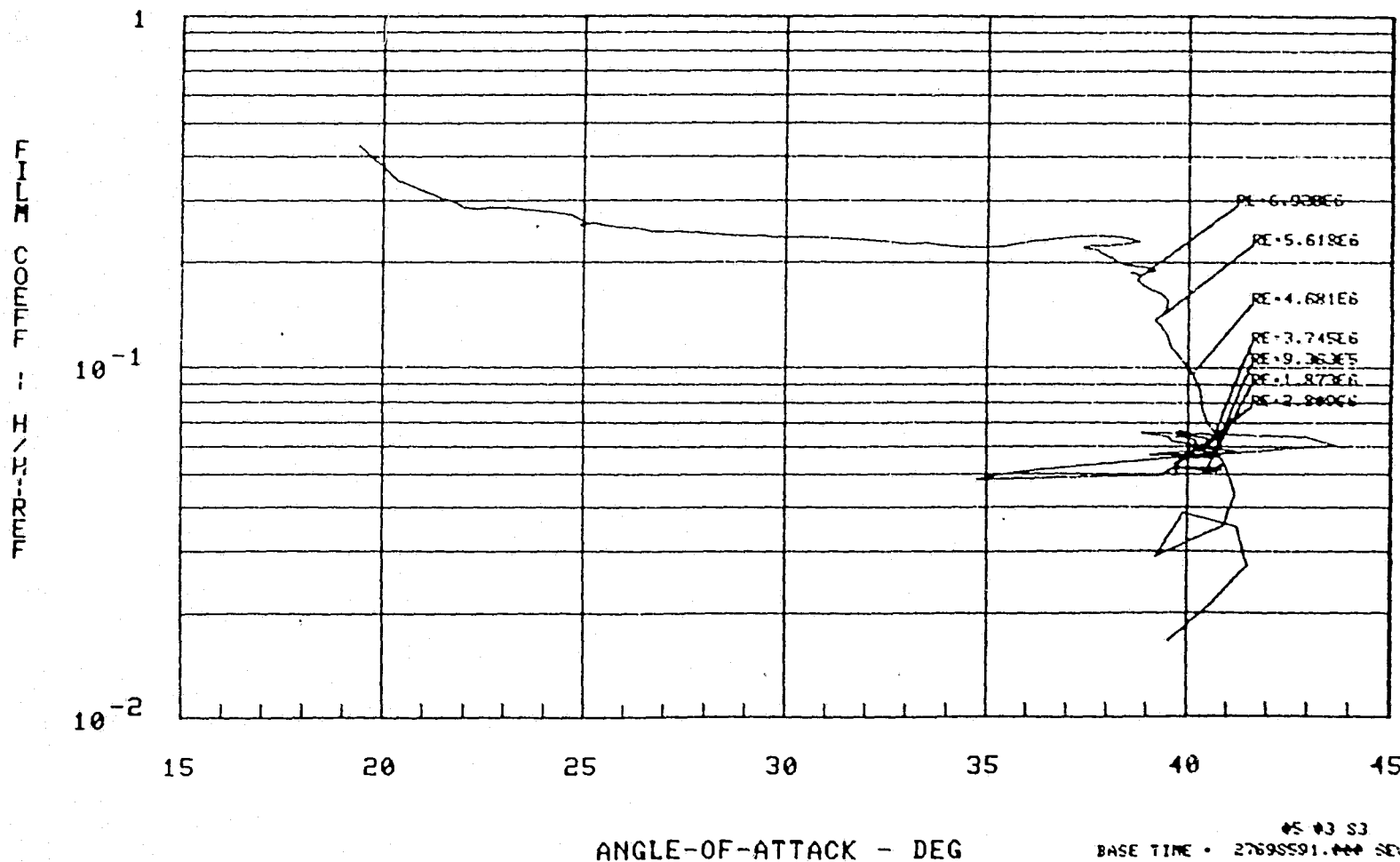


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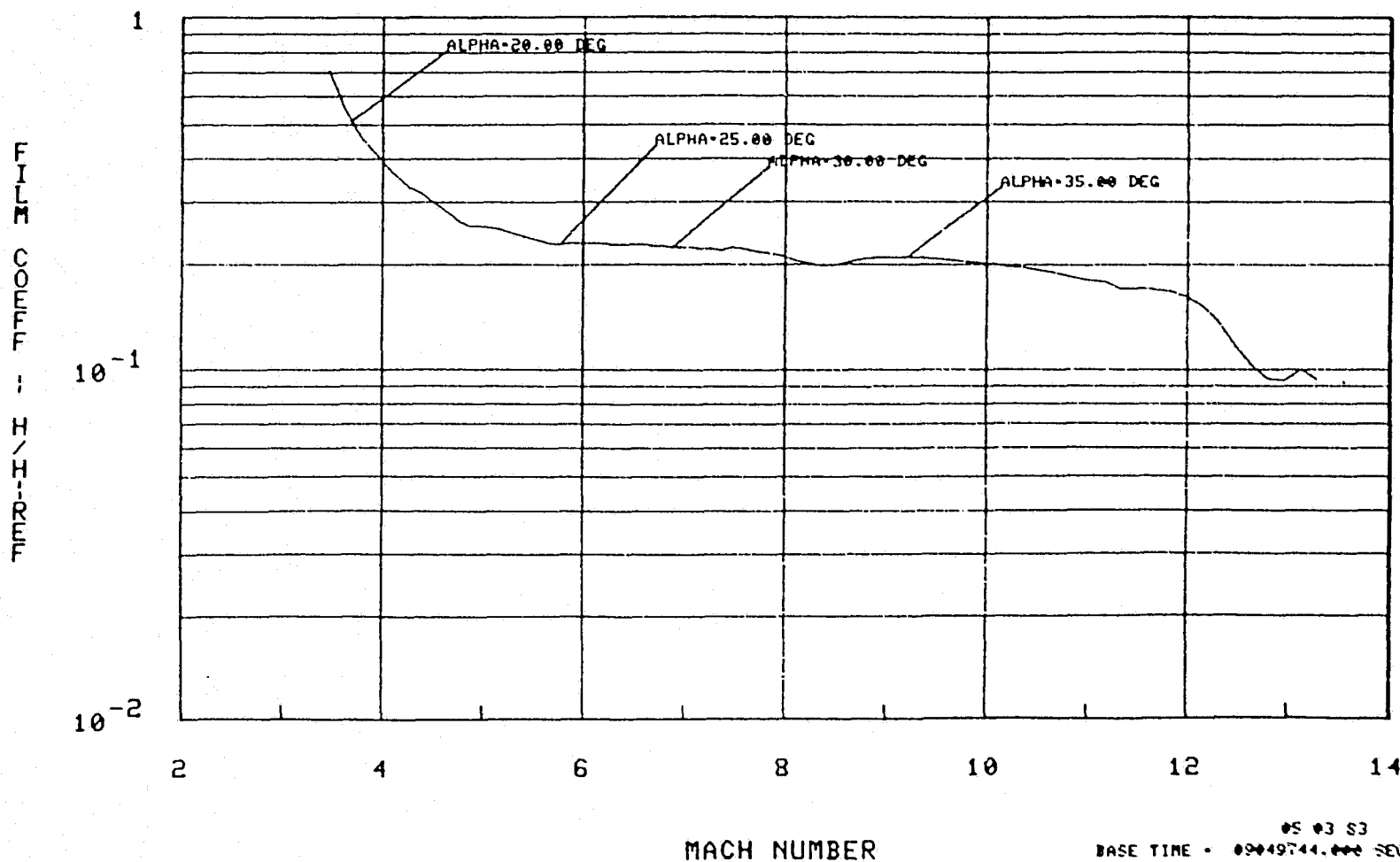


B-255

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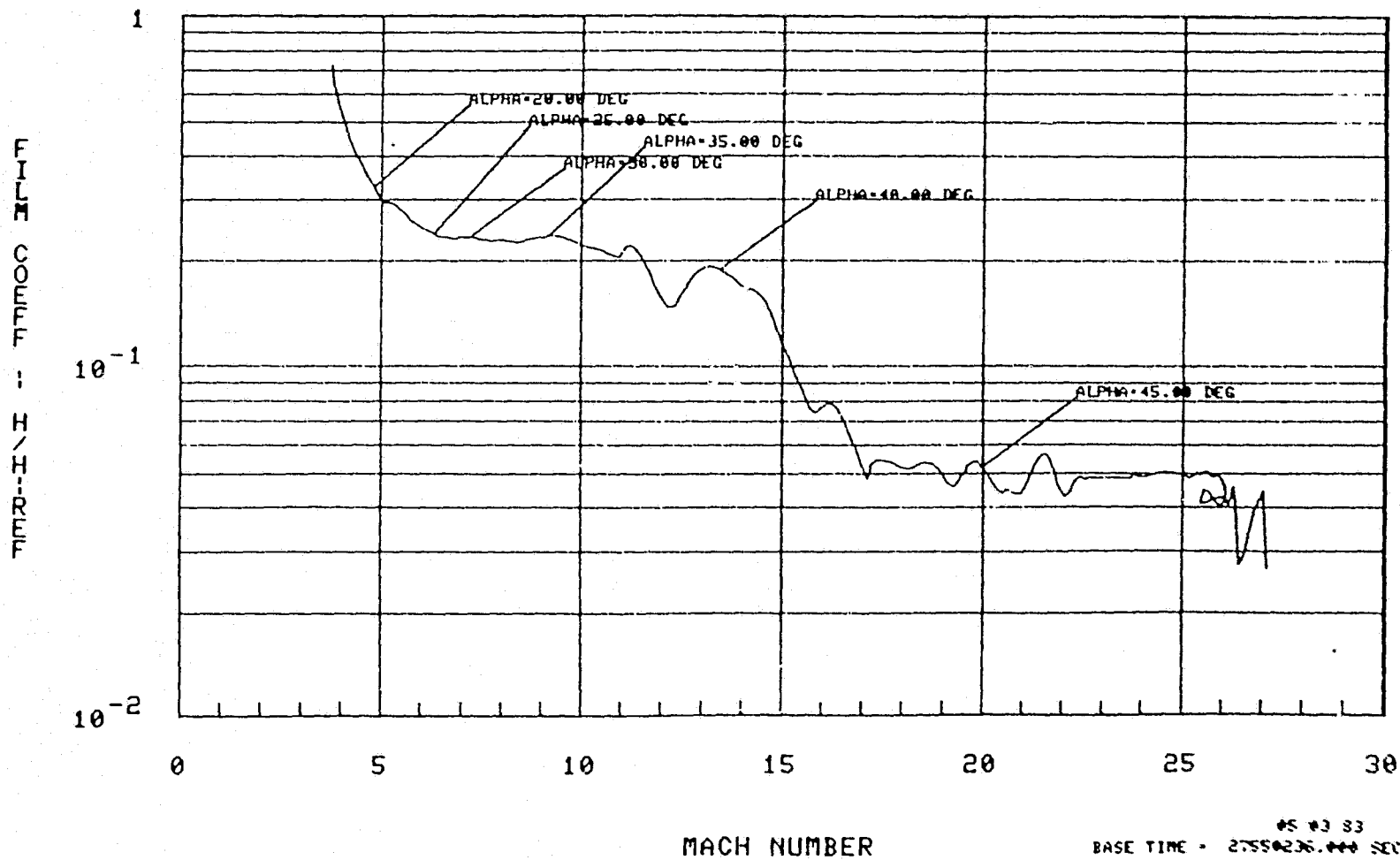


B-256

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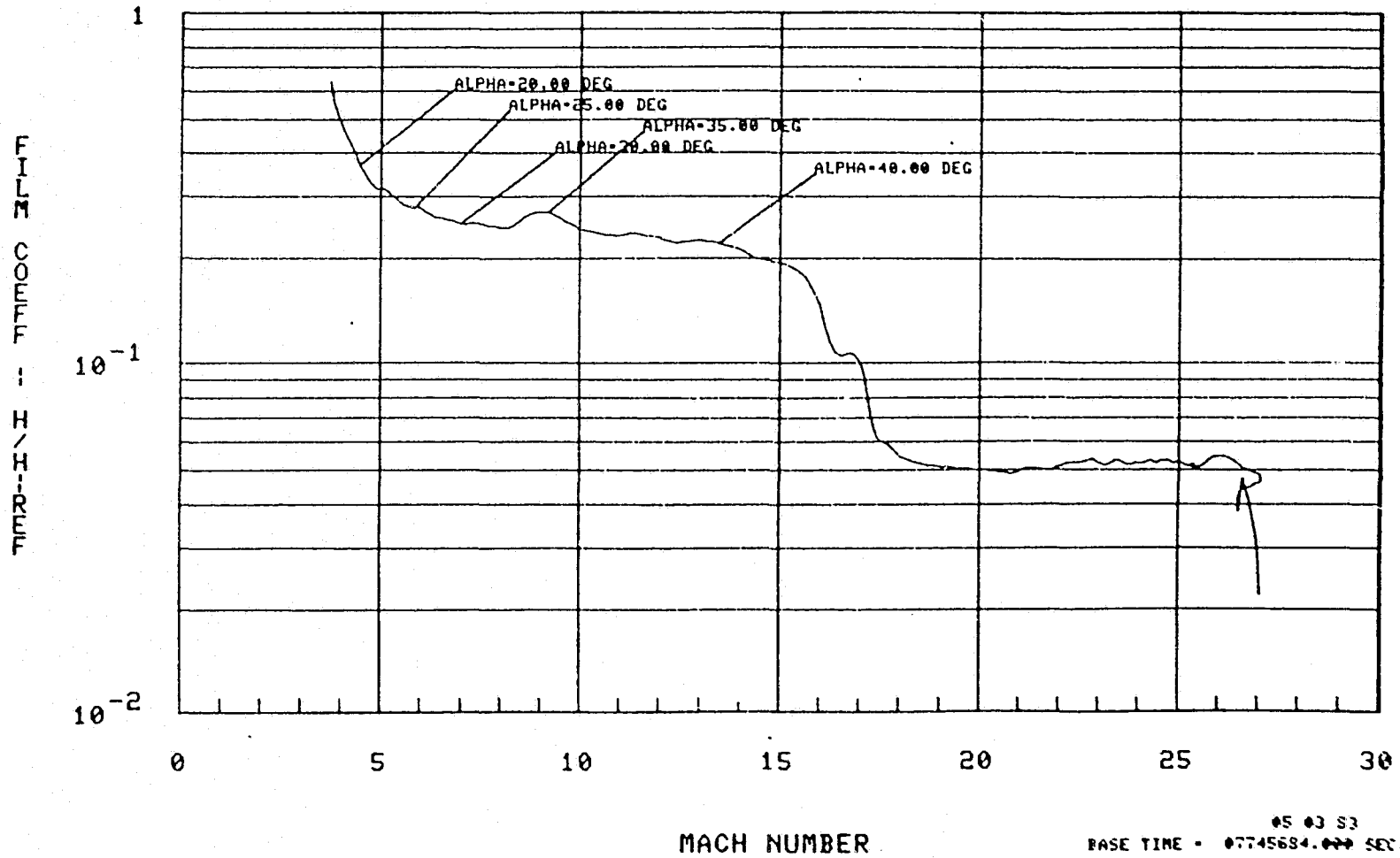
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B-257

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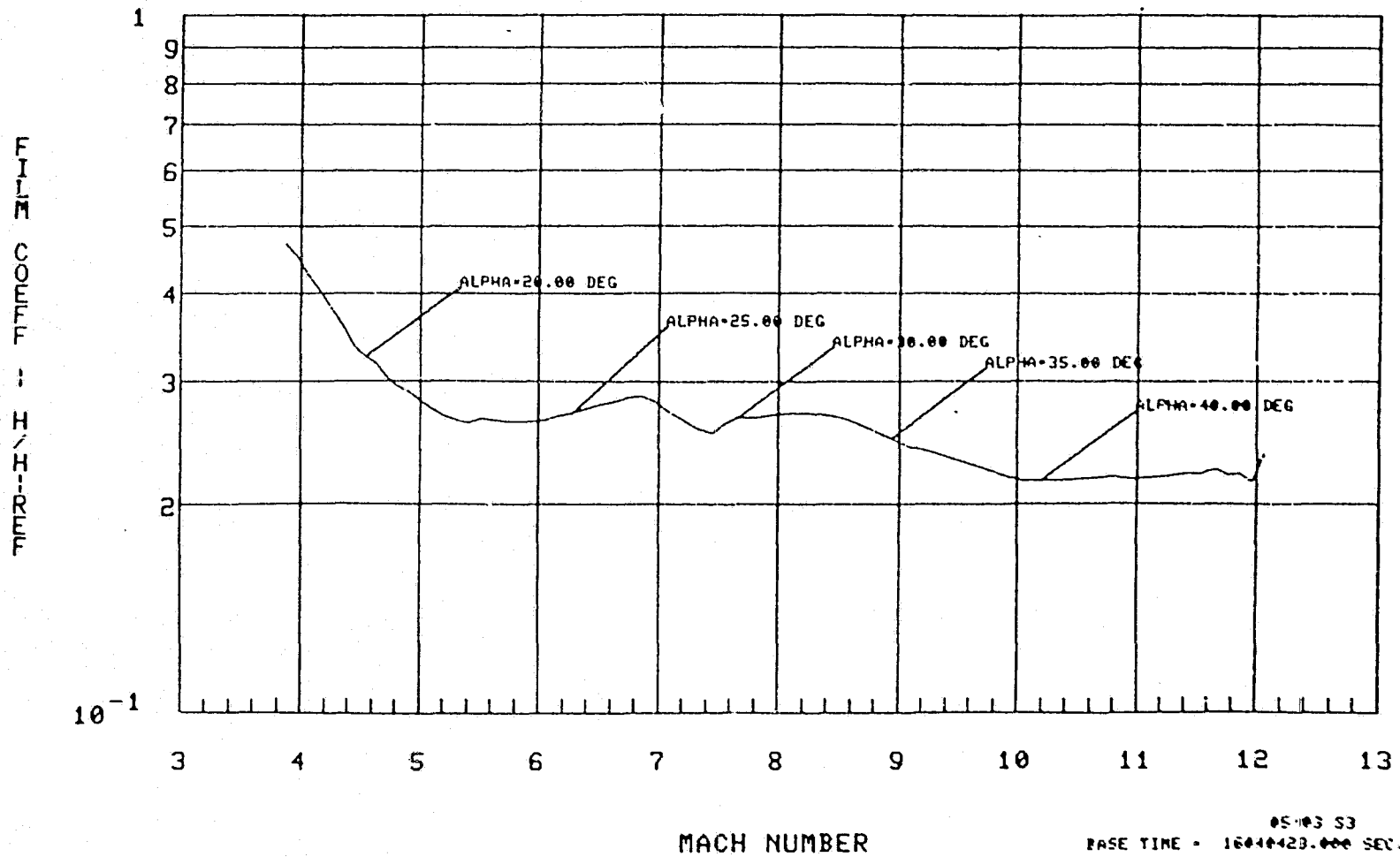
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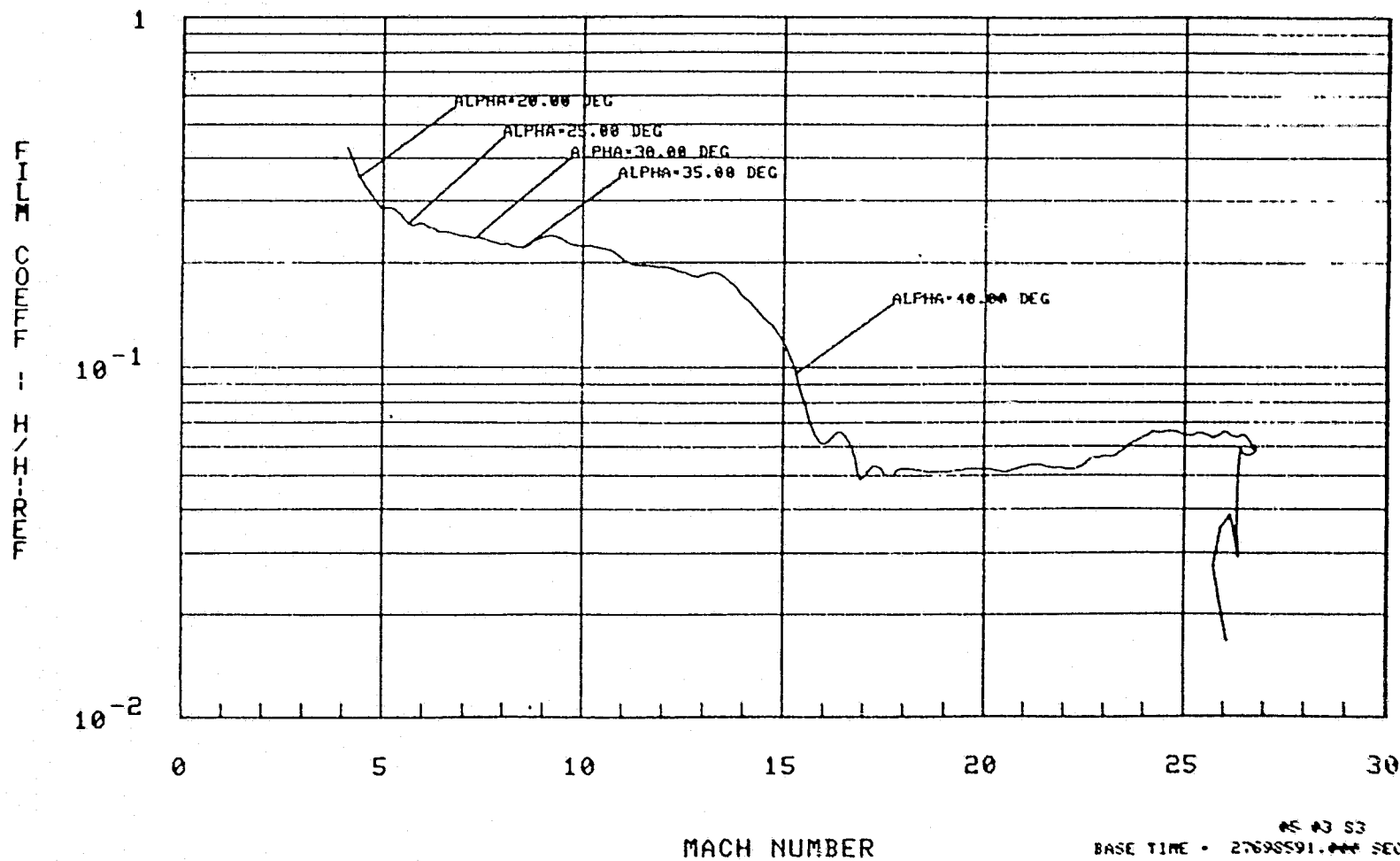


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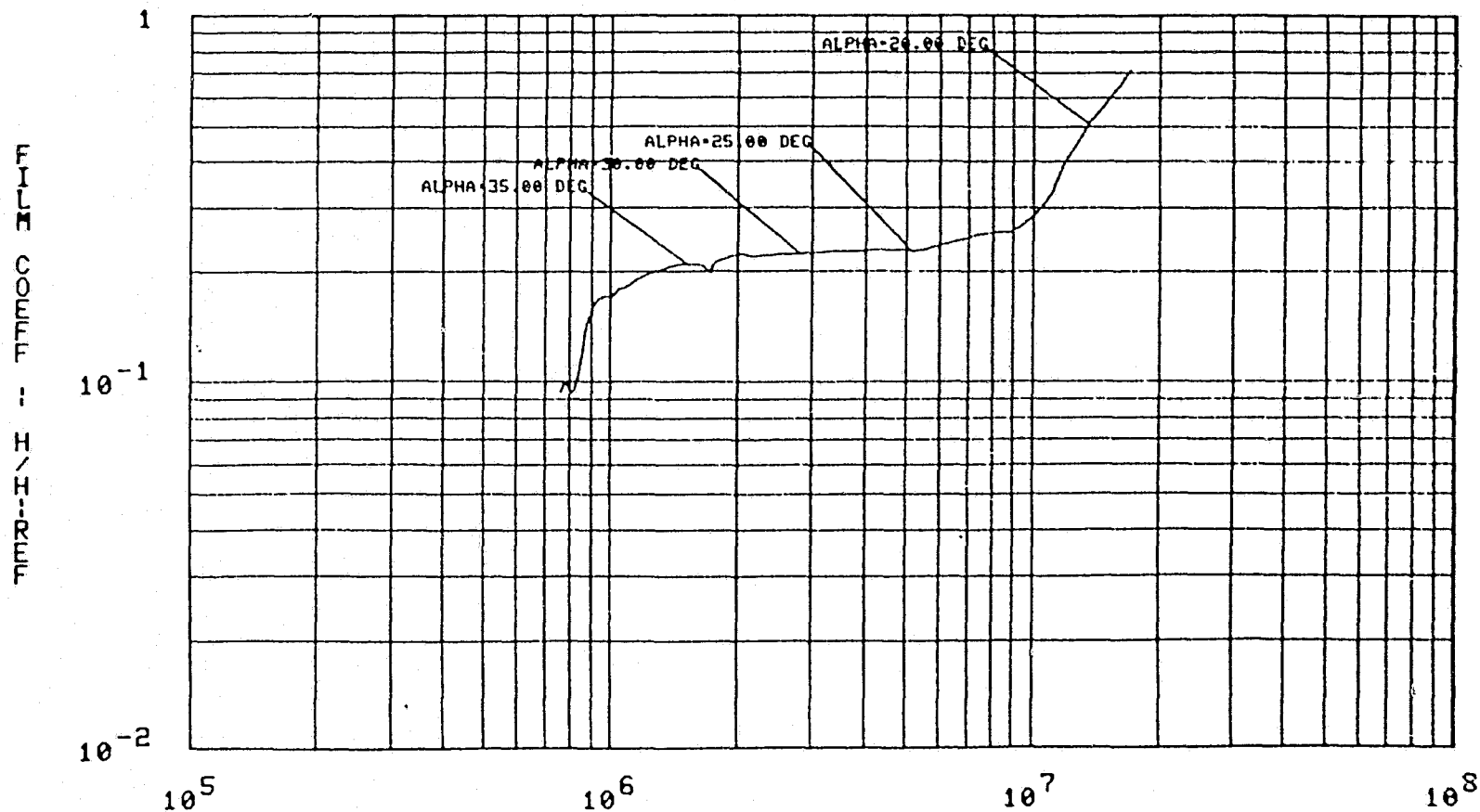


B-260

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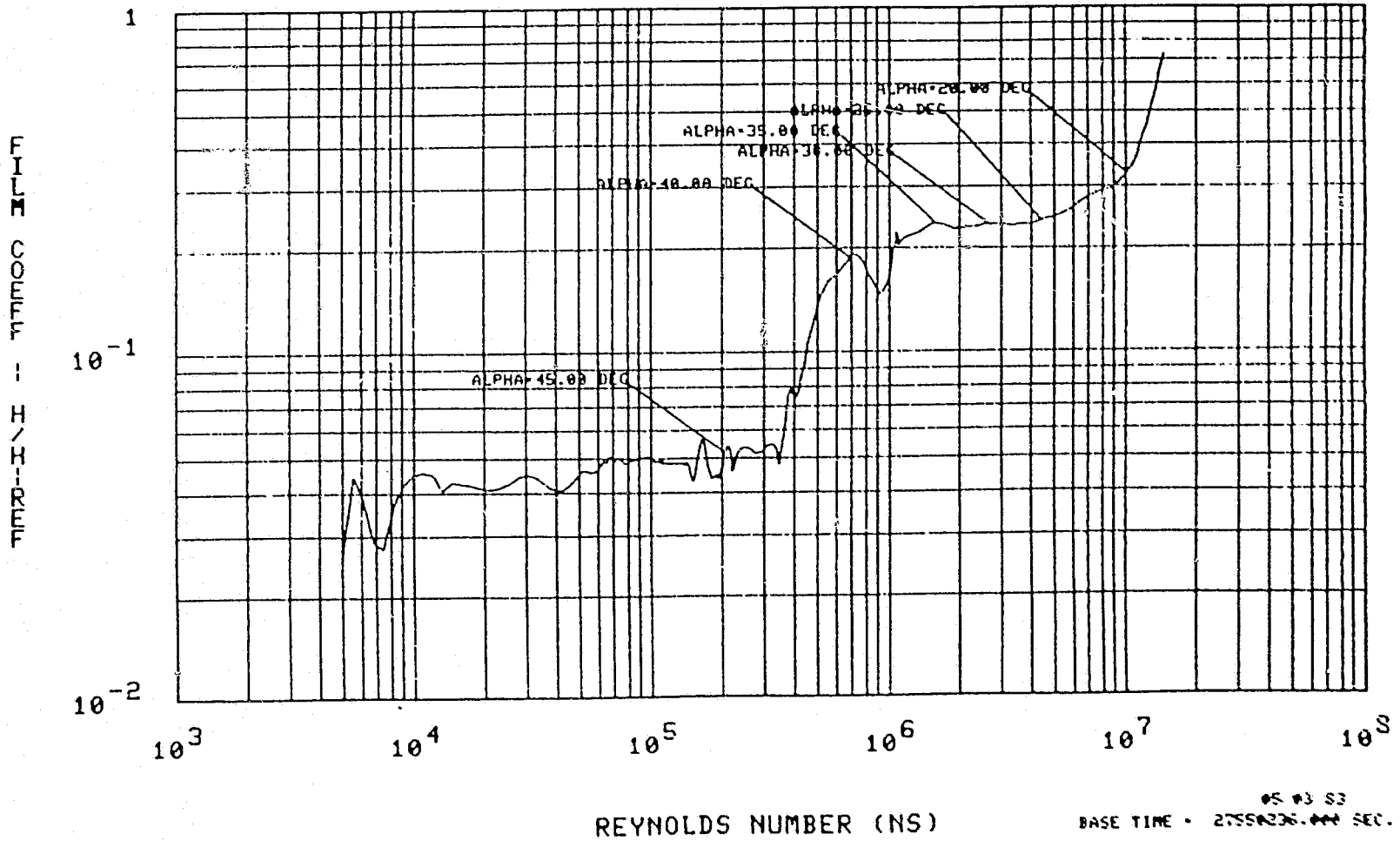
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REYNOLDS NUMBER (NS)

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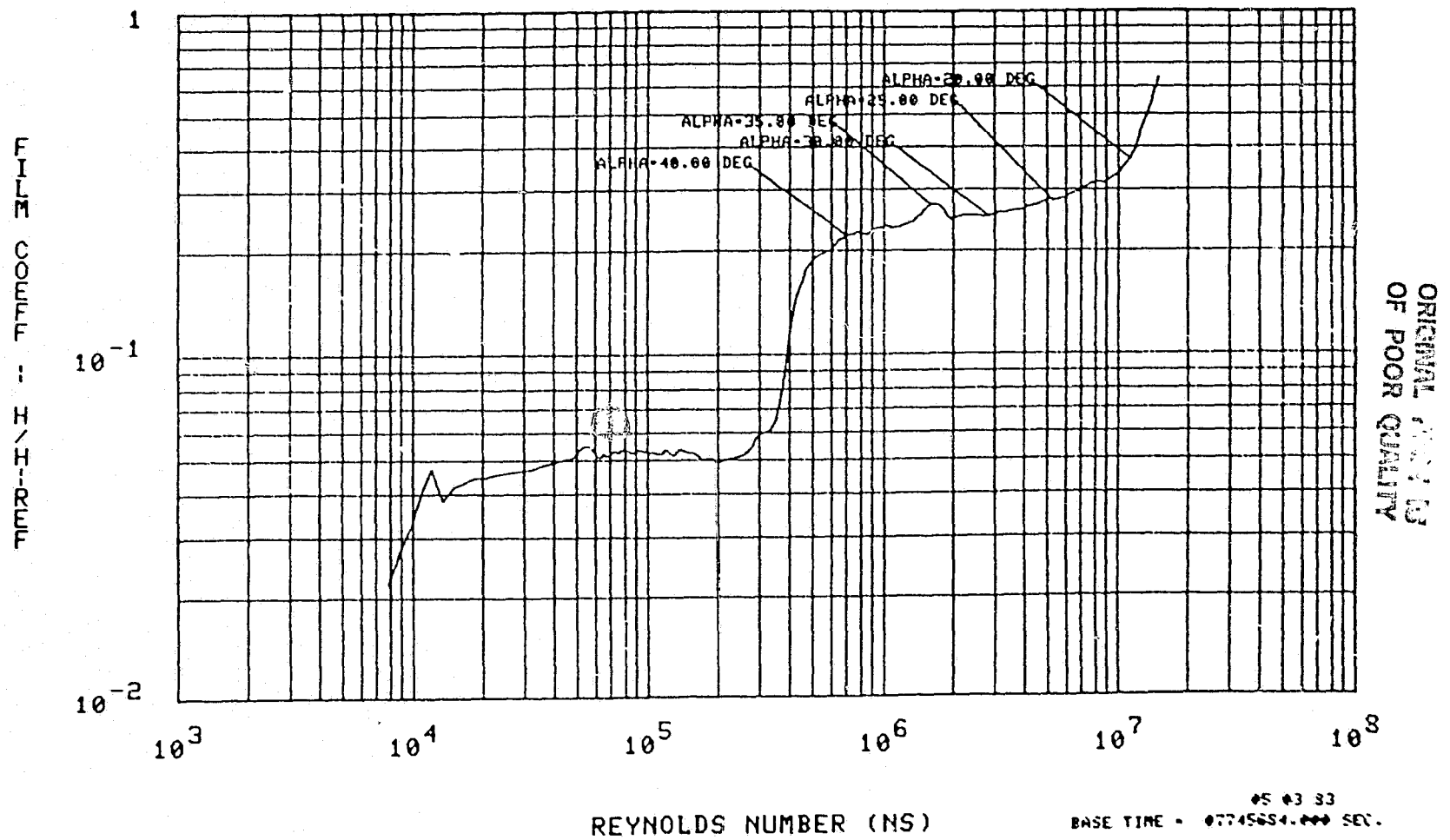


B-262

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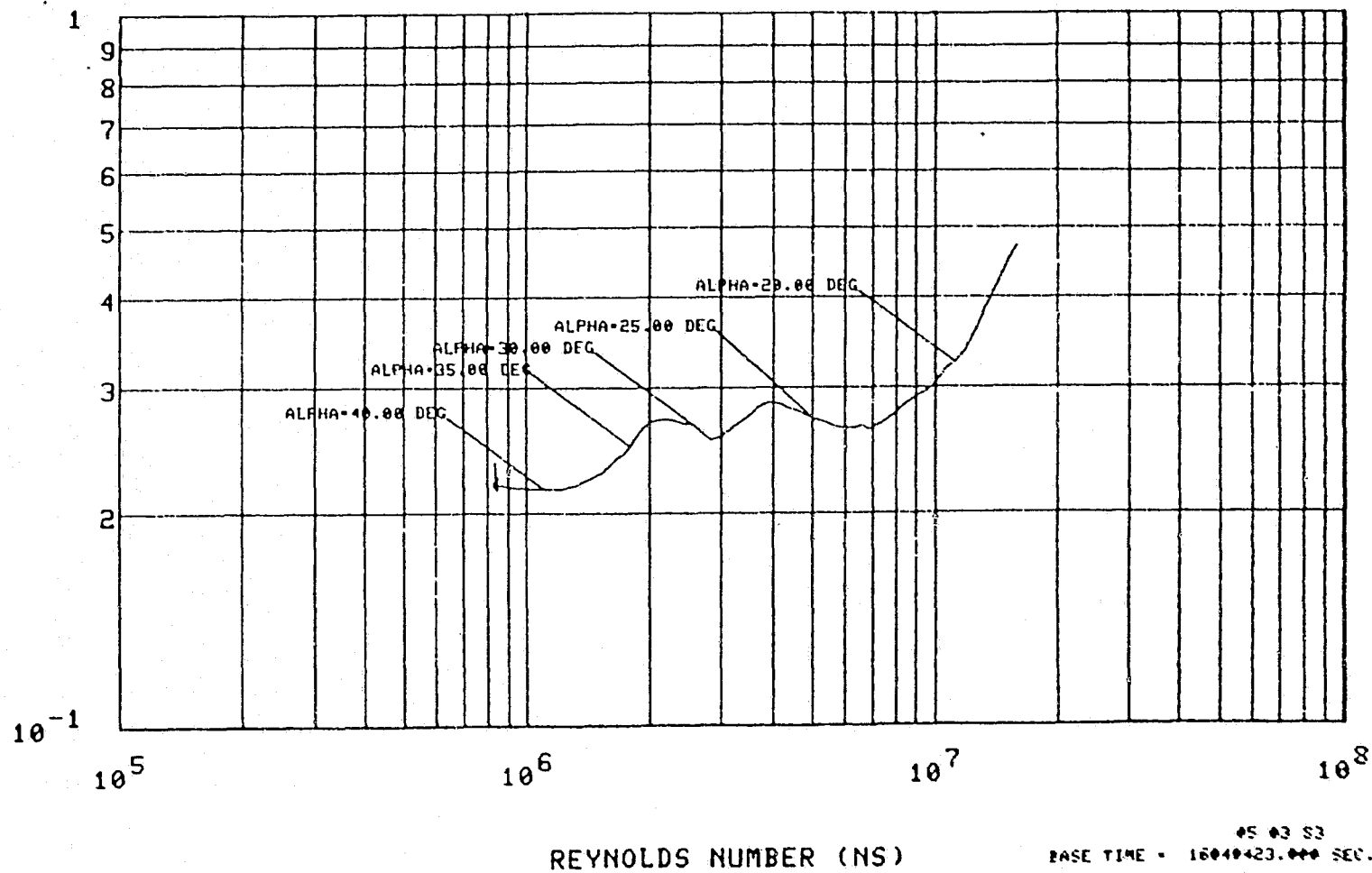
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B-264

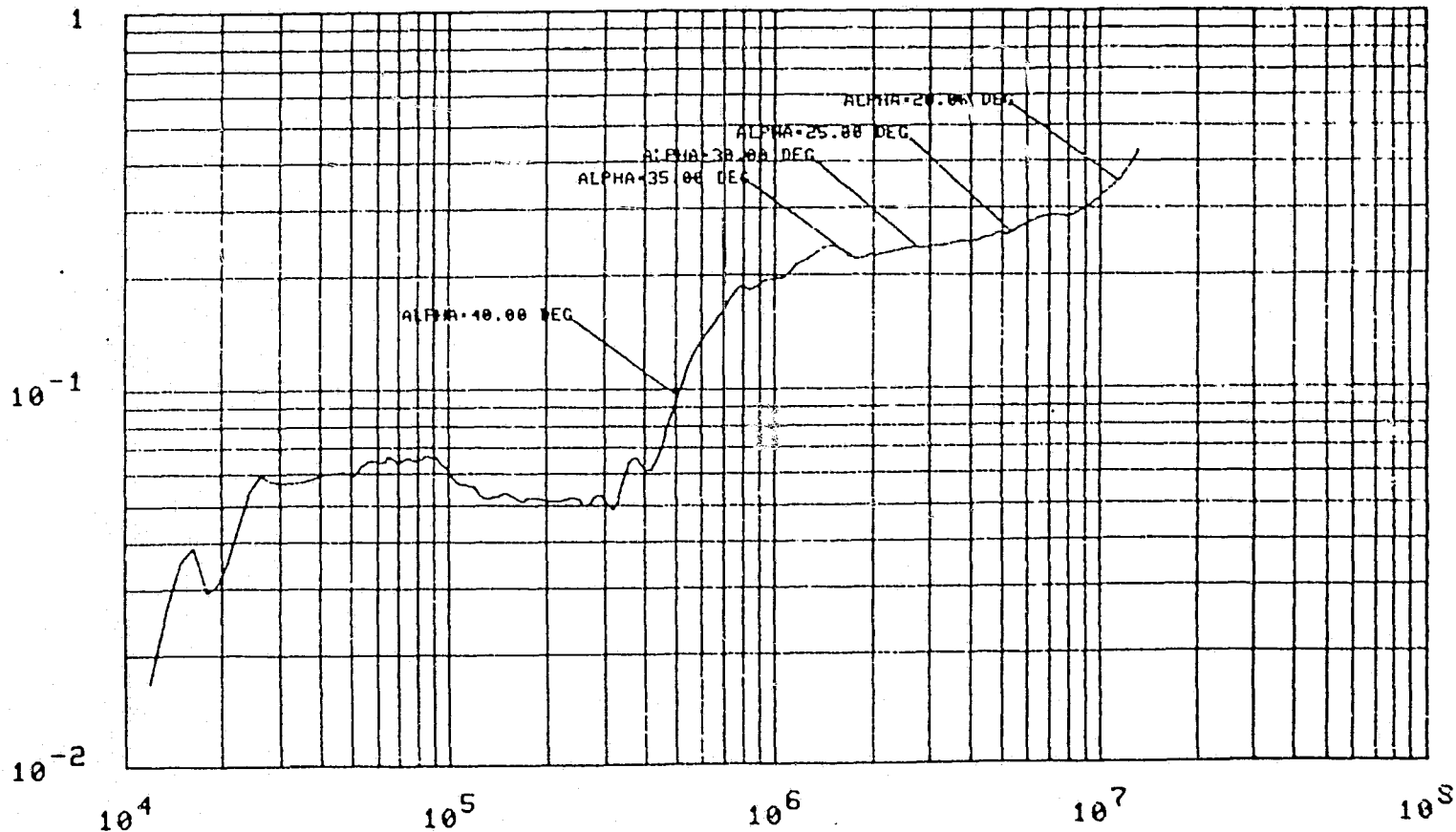


STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.99

U07T9685A/H-REF 150-1350 SEC

FILE COWELL - H/H-RULE

B-265



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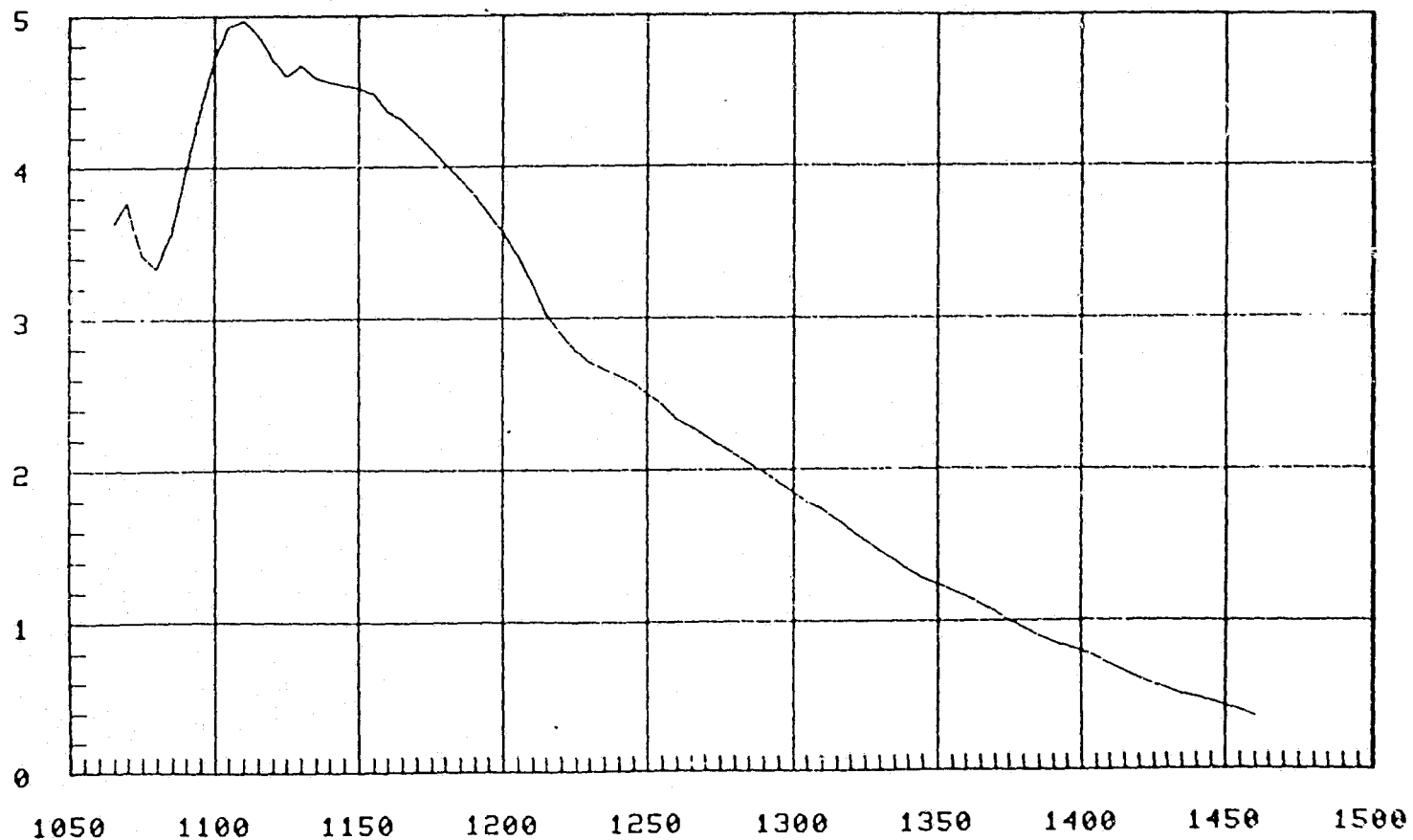
REYNOLDS NUMBER (NS)

BASE TIME • 27695591.000 SEC.

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.99$

U07T9635A

HEATING RATE : BTU/FT² : SEC



TIME - SECONDS

05 43 53

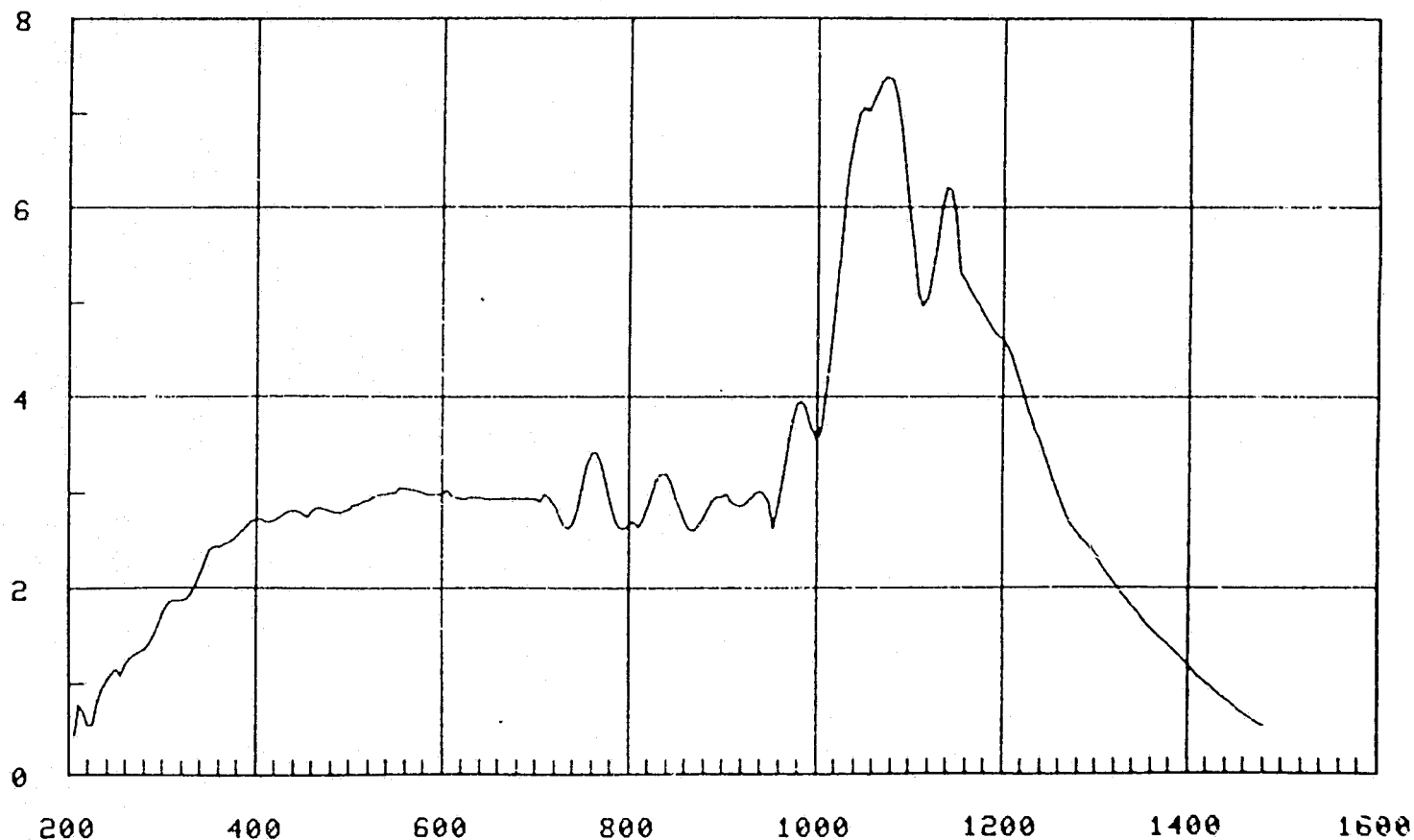
ORIGINAL PAGE IS
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B-266

STS-2 (107 FT LENGTH WING 50% SPAN) $X/C=0.99$

U07T9685A

HEATING RATE - BTU/INCH-SQ - SEC



TIME - SECONDS

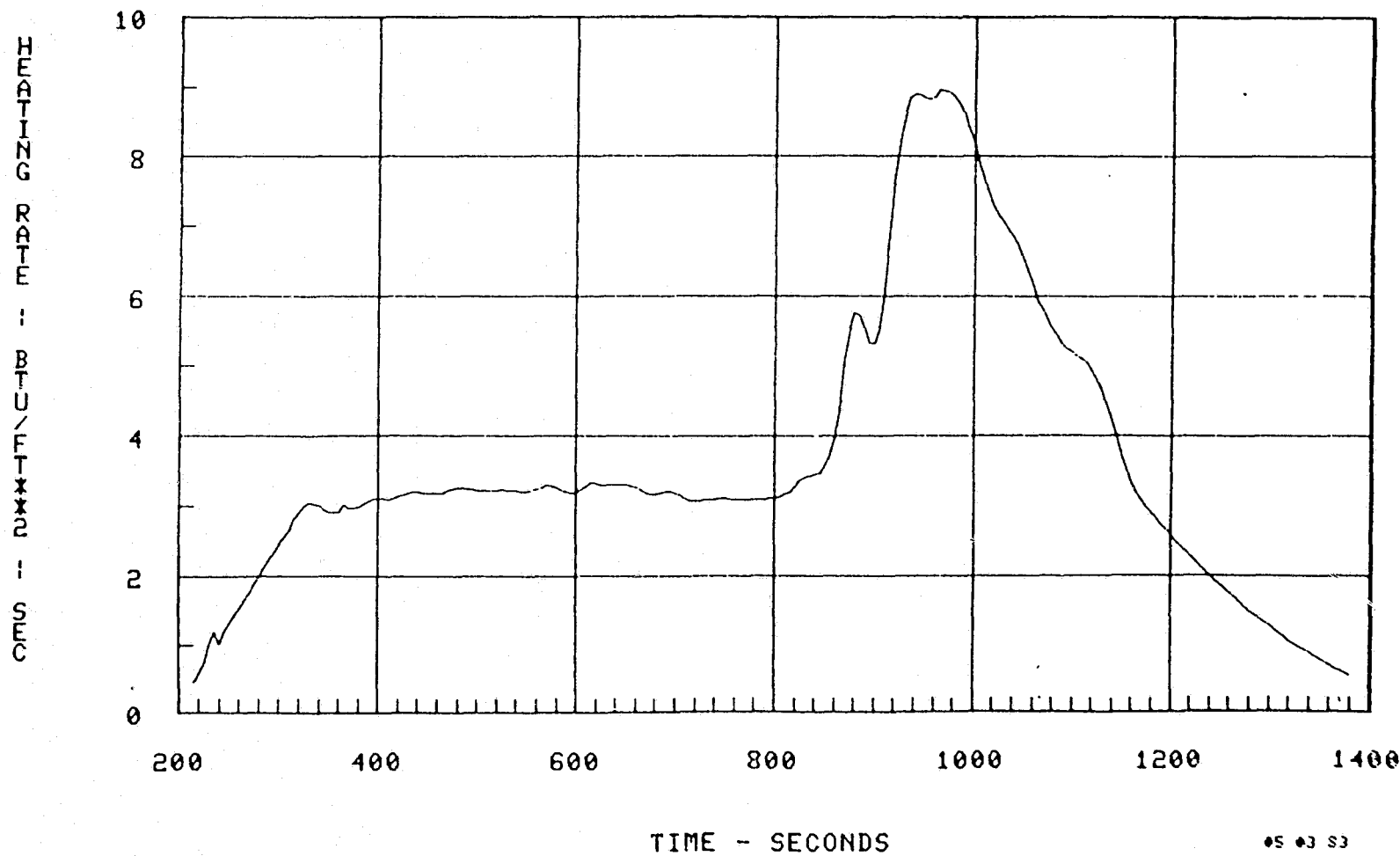
#5 #3 S3

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B-267

STS-3 (107 FT LENGTH WING 50% SPAN) X/C=0.99

U07T9685A

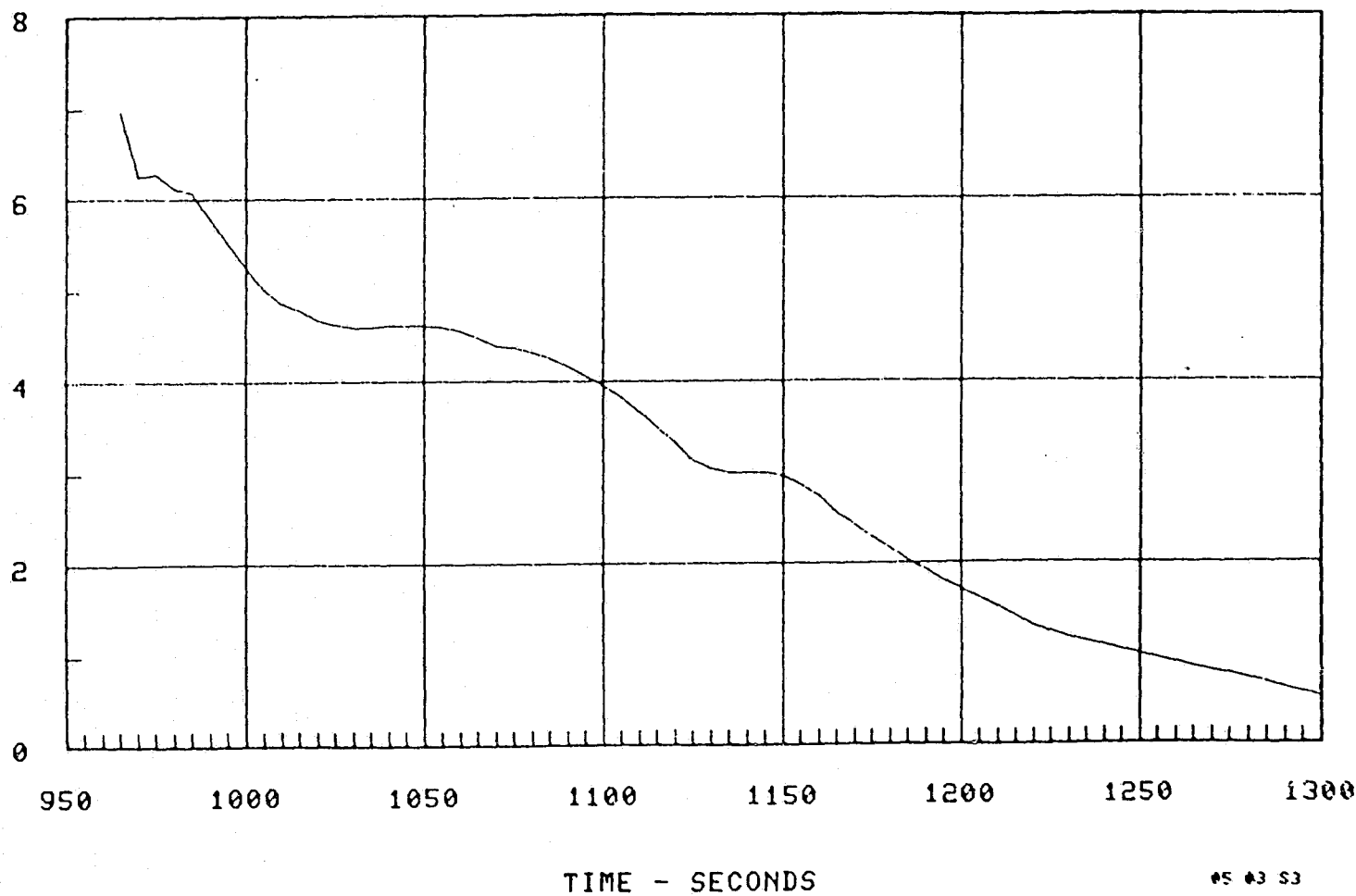


B-268

STS-4 (107 FT LENGTH WING 50% SPAN) $X/C=0.99$

U0719685A

HEATING RATE : BTU/FT**2 : SEC



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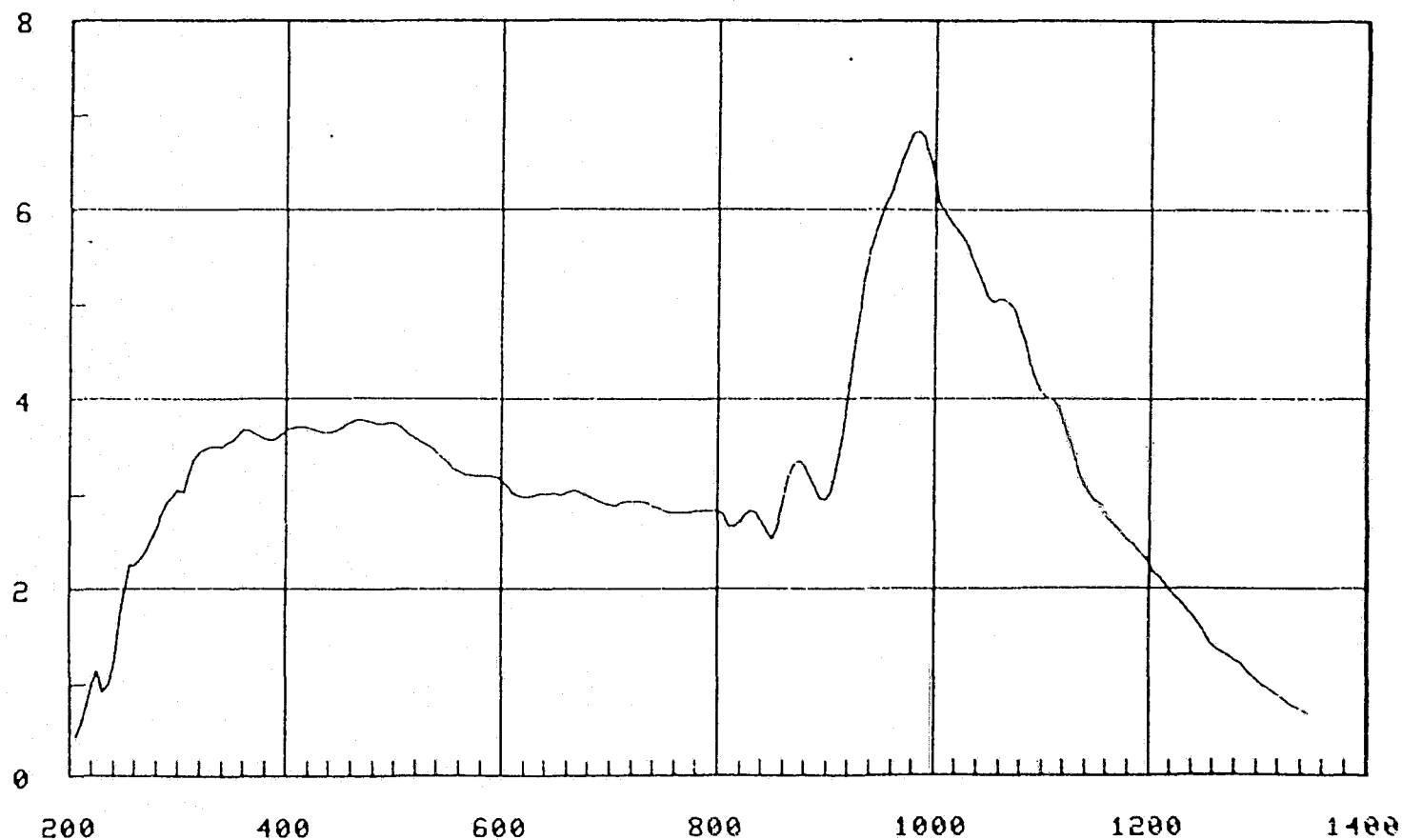
#5 #3 S3

B-269

STS-5 (107 FT LENGTH WING 50% SPAN) X/C=0.99

U07T9685A

HEATING RATE - BULB TEMPERATURE - SEC



TIME - SECONDS

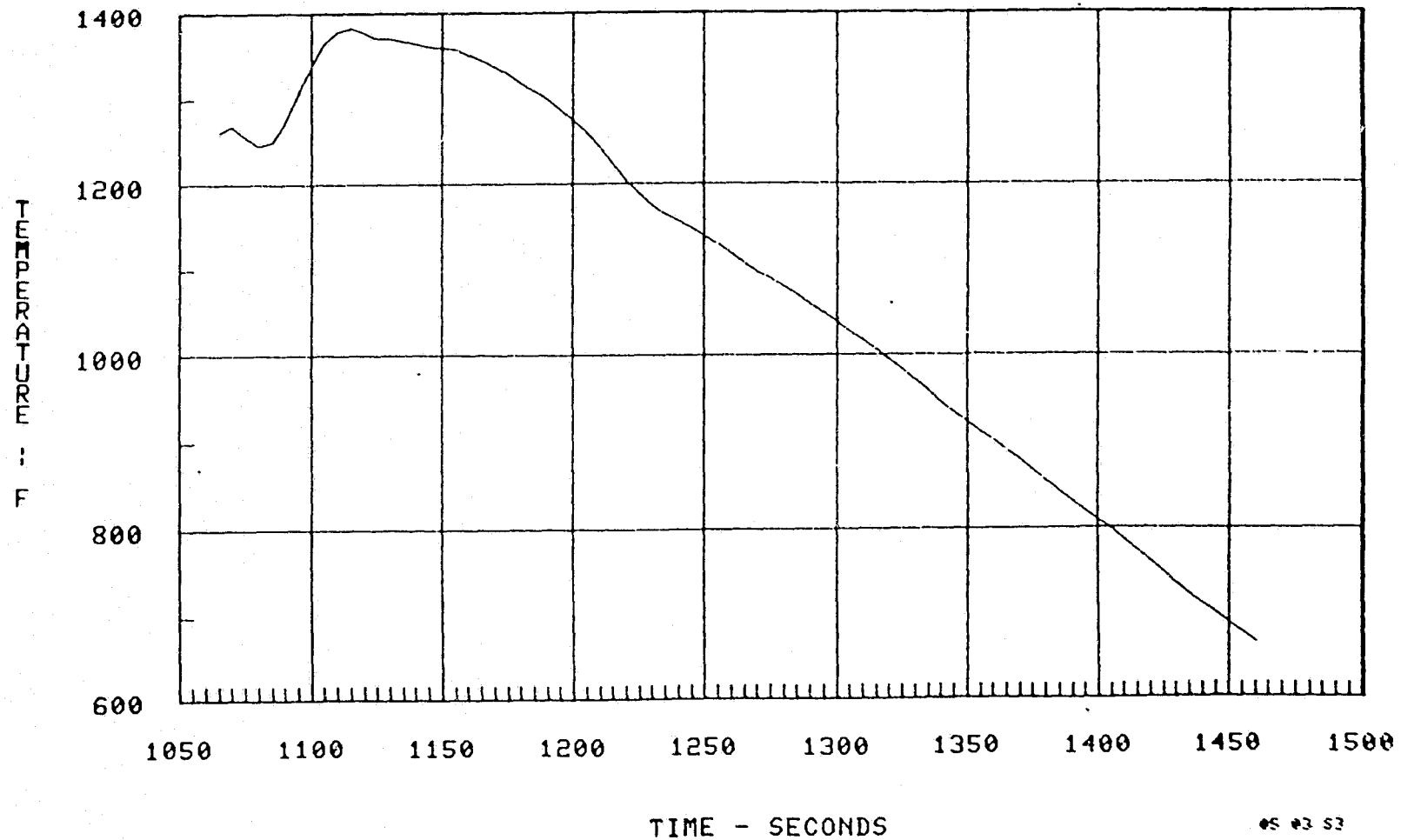
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B-270

STS-1 (107 FT LENGTH WING 50% SPAN) $X/C=0.99$

U6719685A



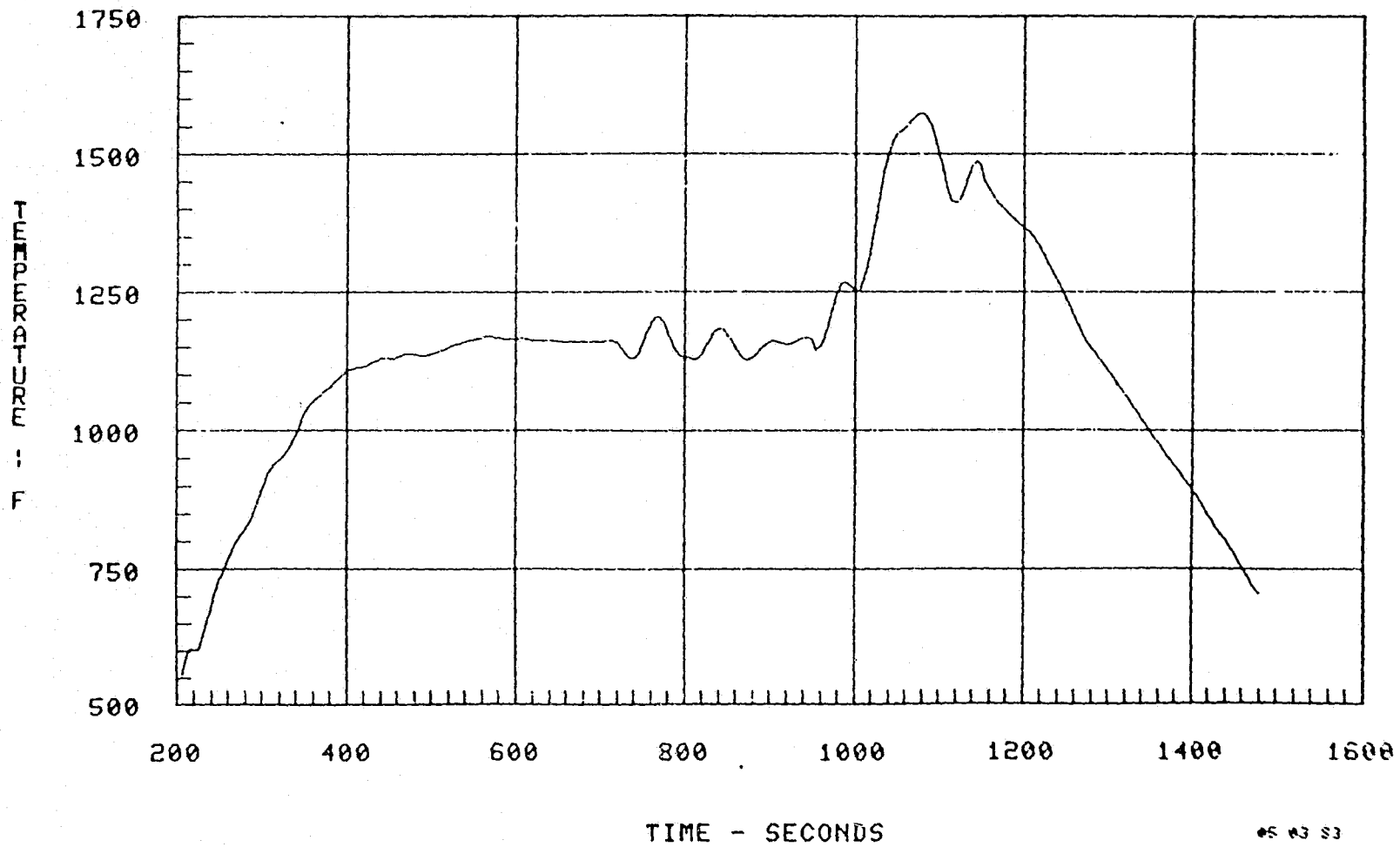
B-271

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45 43 53

STS-2 (107 FT LENGTH WING 50% SPAN) X/C=0.99

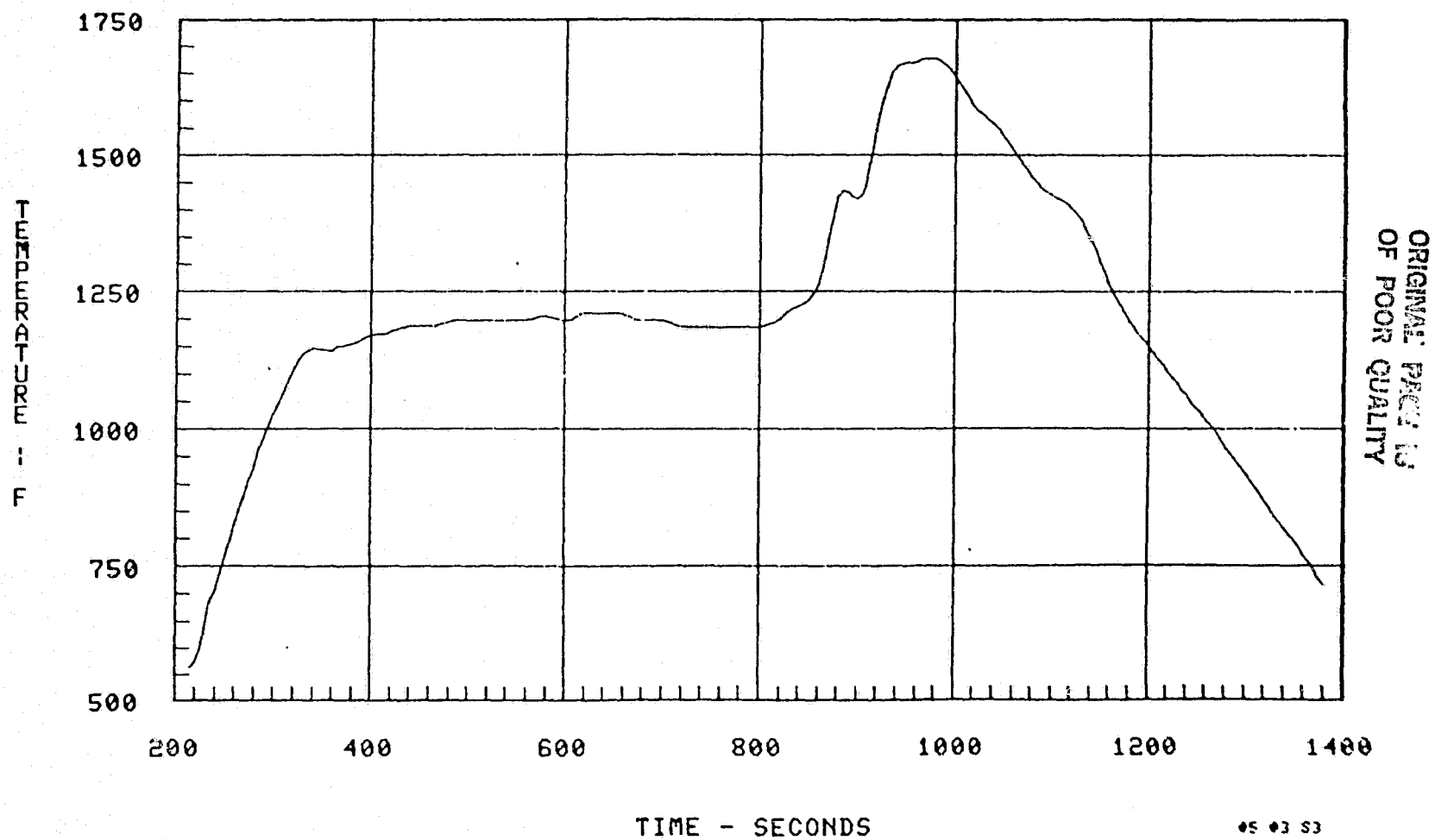
J07T9685A



B-272

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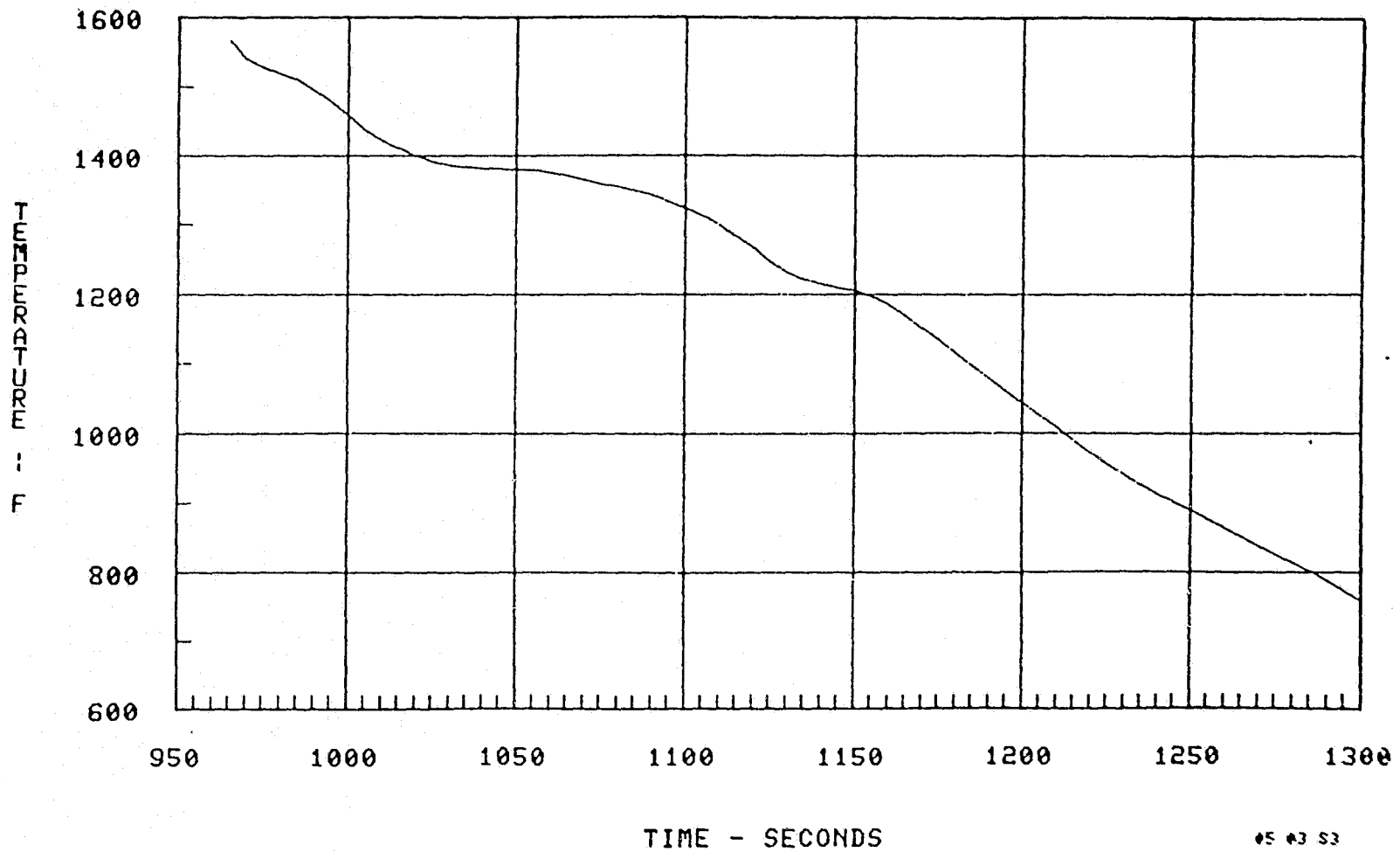
U07T9685A



B-273

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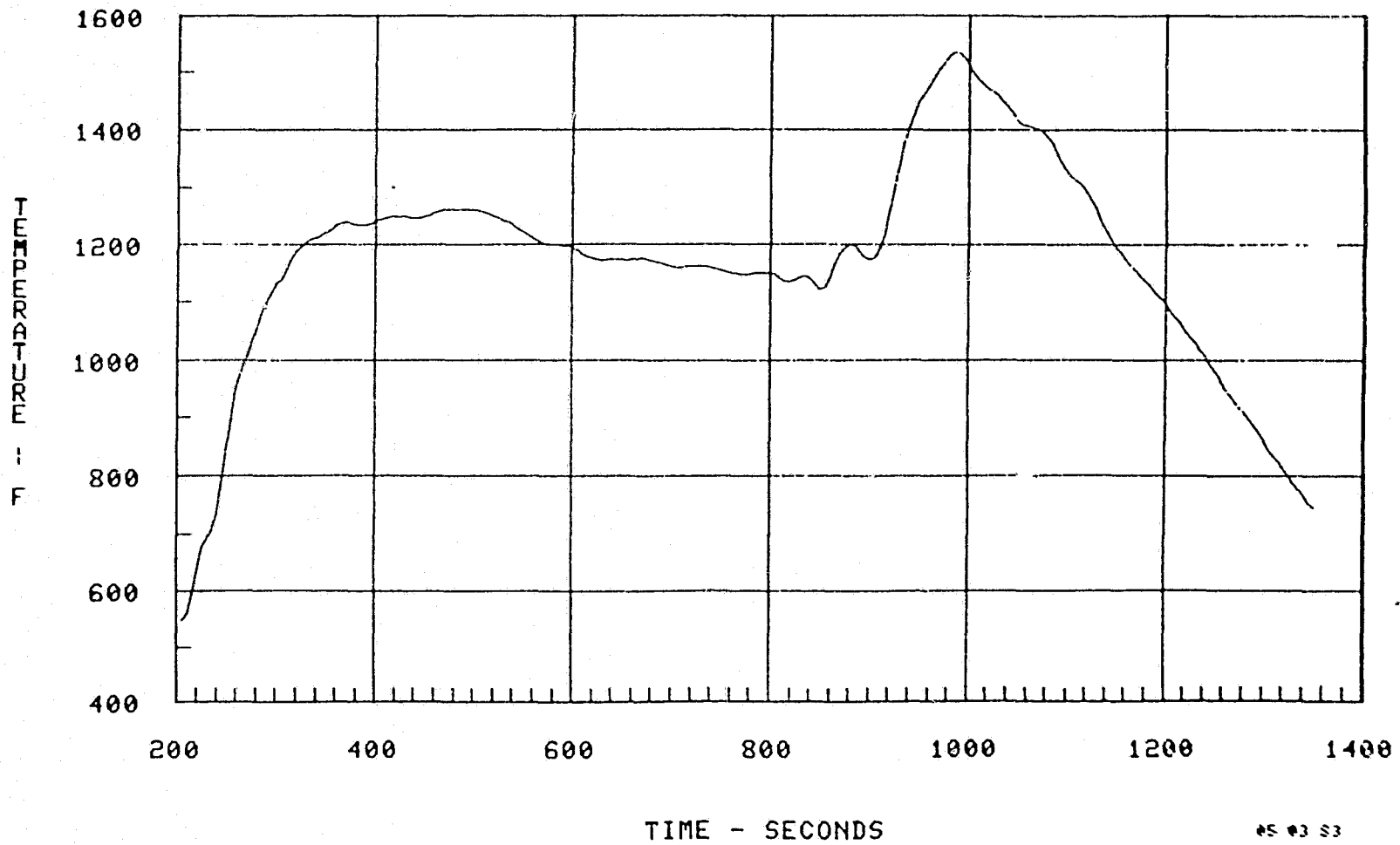
U07T9685A



B-274

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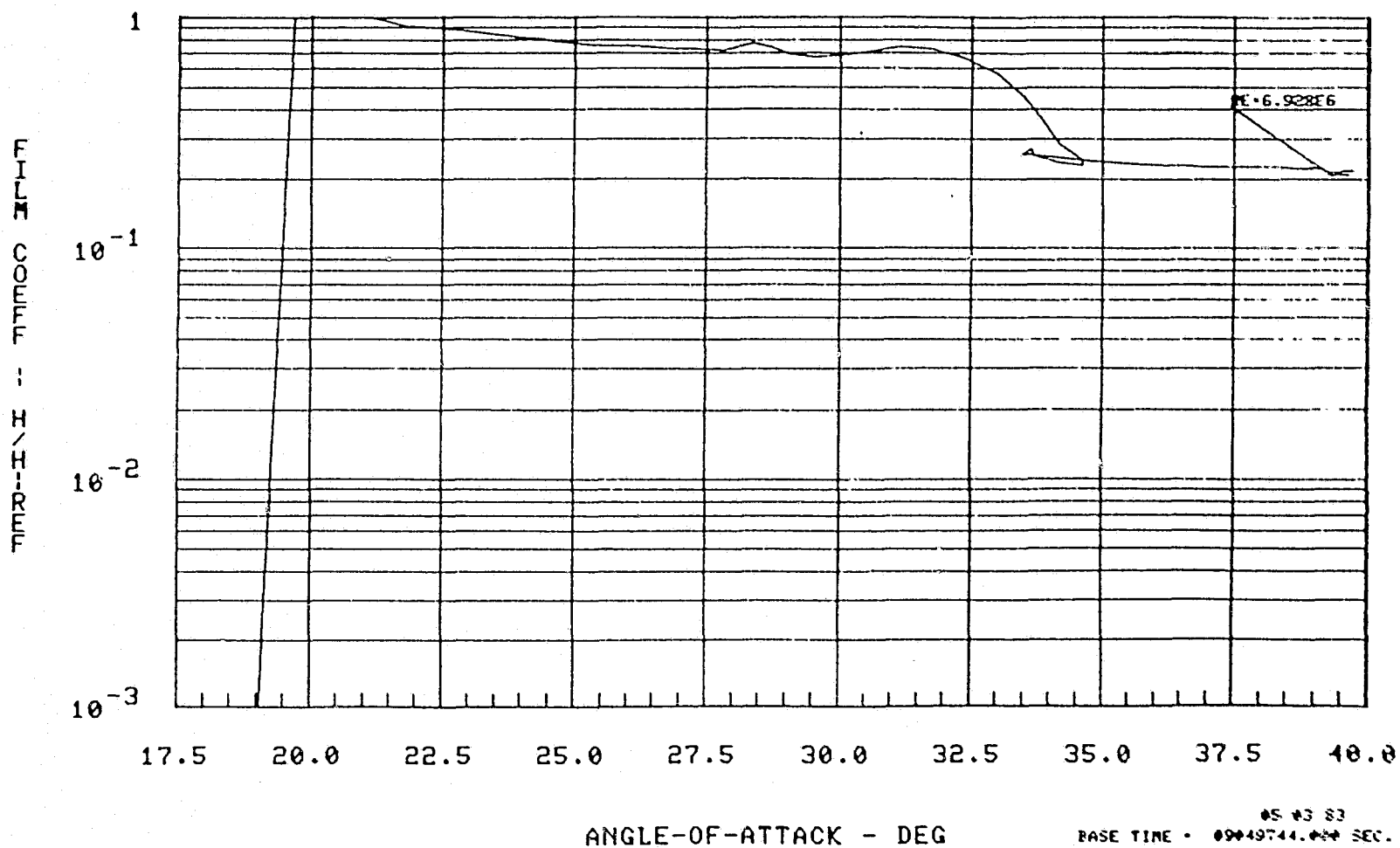
U07T9685A



B-275

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.15.

U07T9705A/H-REF 1065-1460, SEC

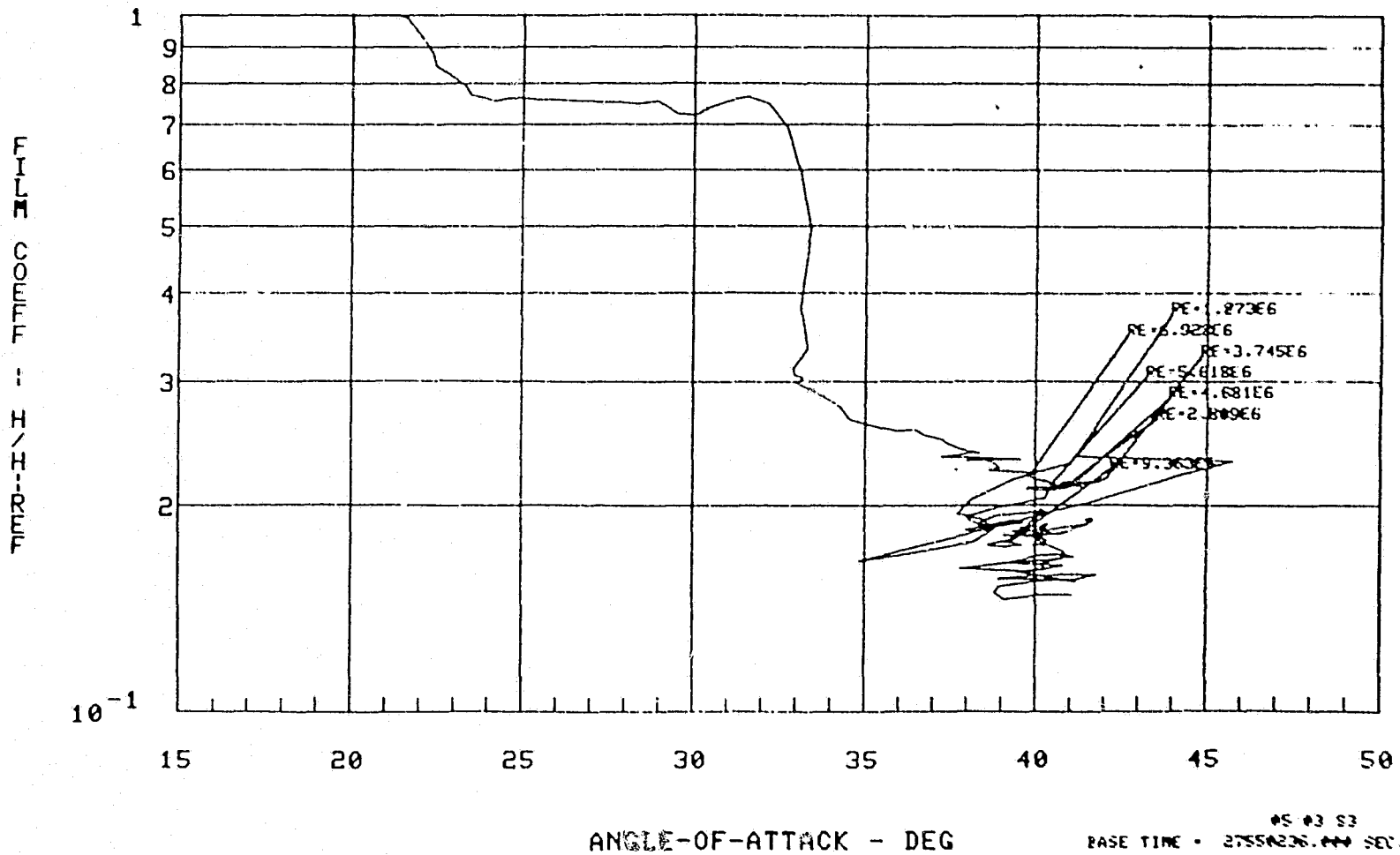


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B-276

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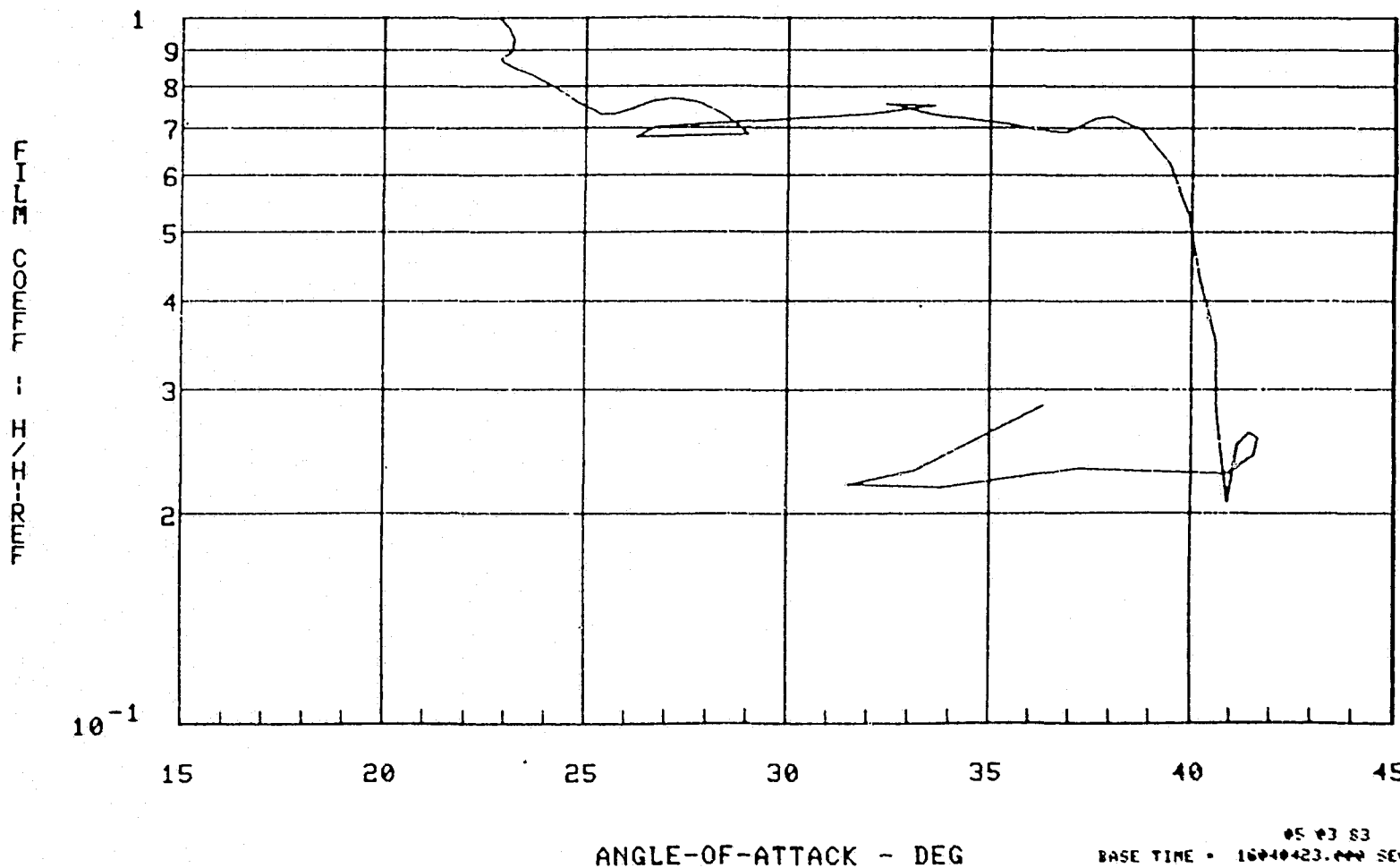
U07T9705A/H-PEF 200-1480 SEC



B-277

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.15

U07T9705A/H-PEF 965-1300 SEC

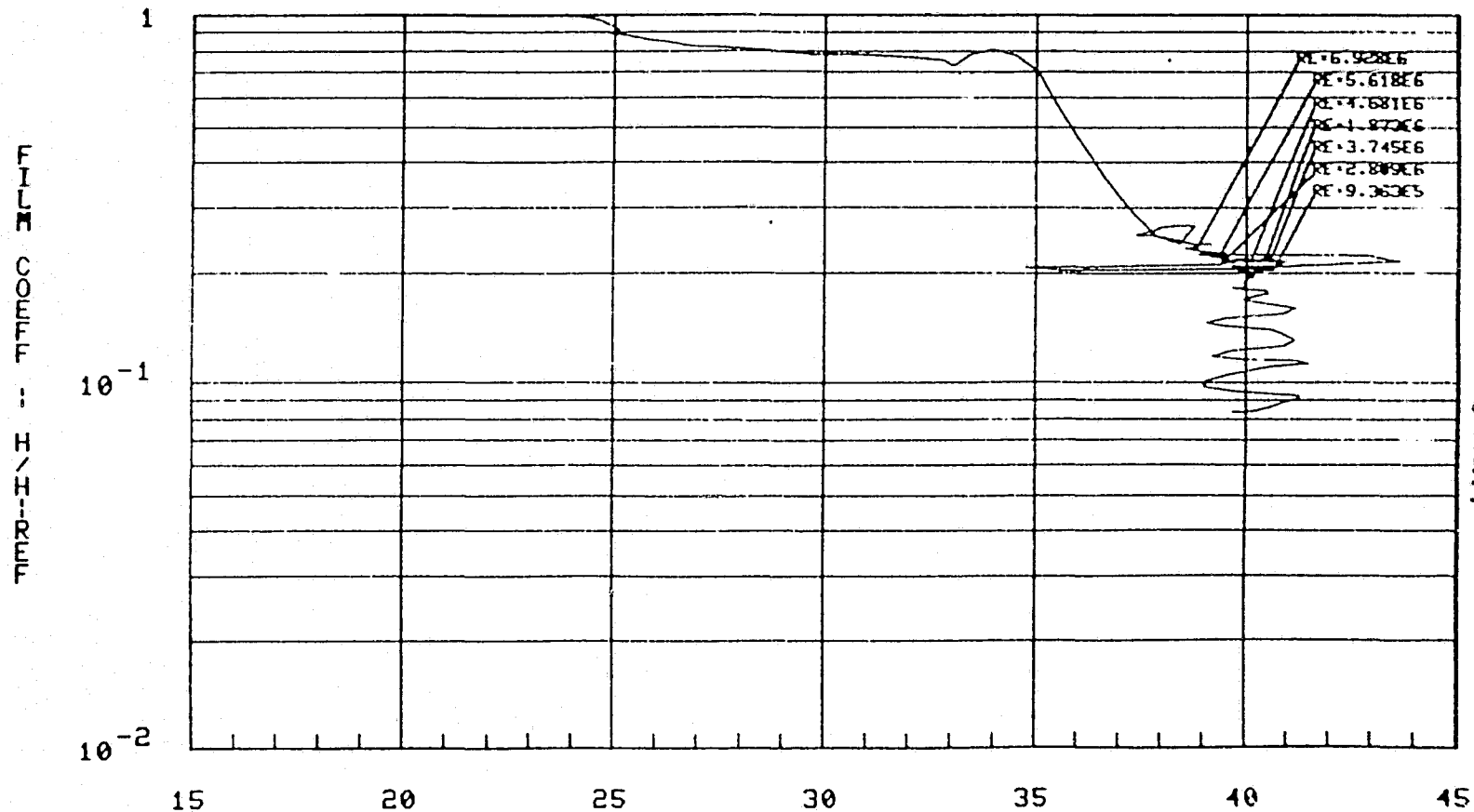


B-278

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U07T9705A/H-REF 150-1350 SEC



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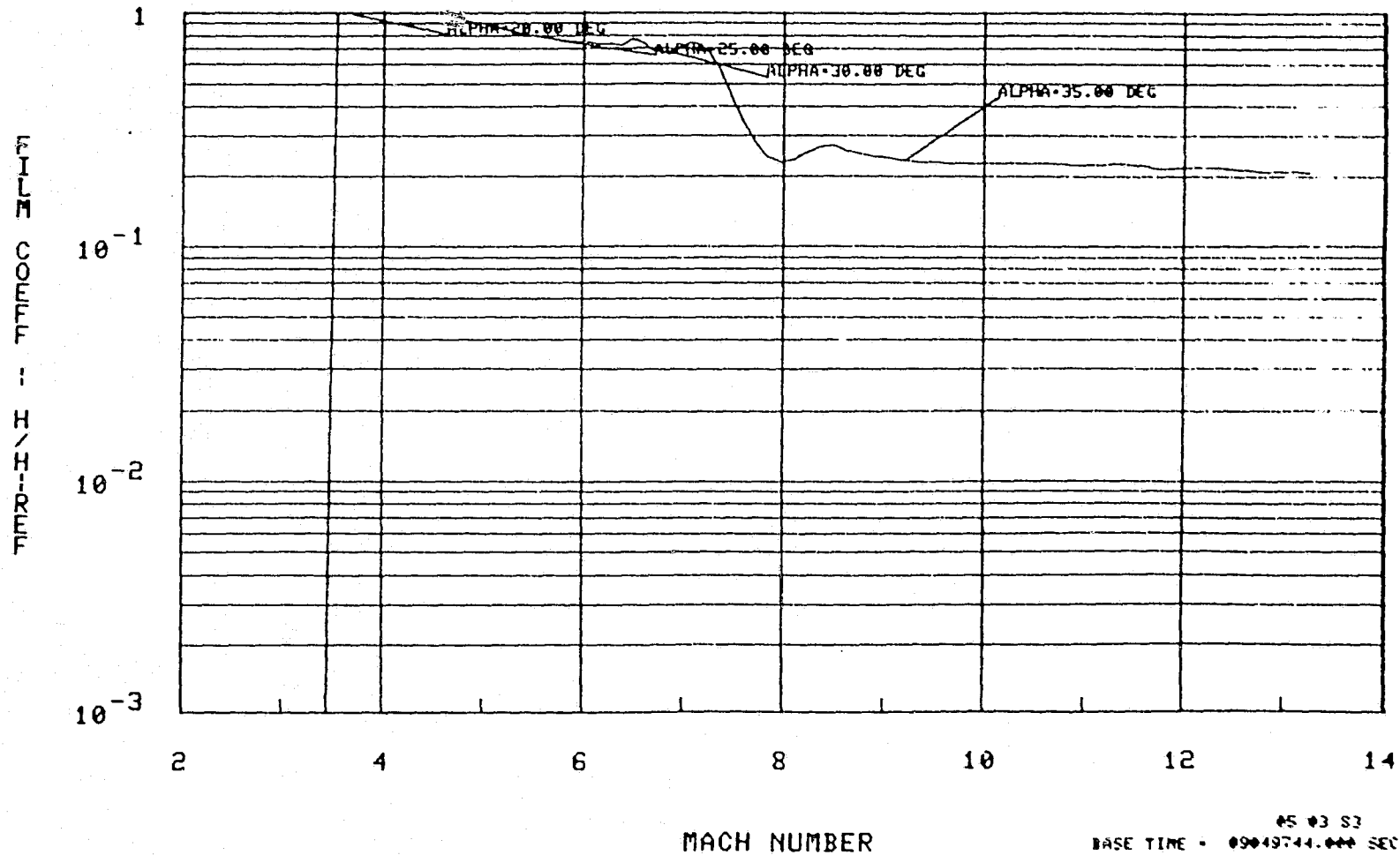
ANGLE-OF-ATTACK - DEG

BASE TIME = 27698591.000 SEC.

B-279

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U07T9705A/H-REF 1065-1460 SEC

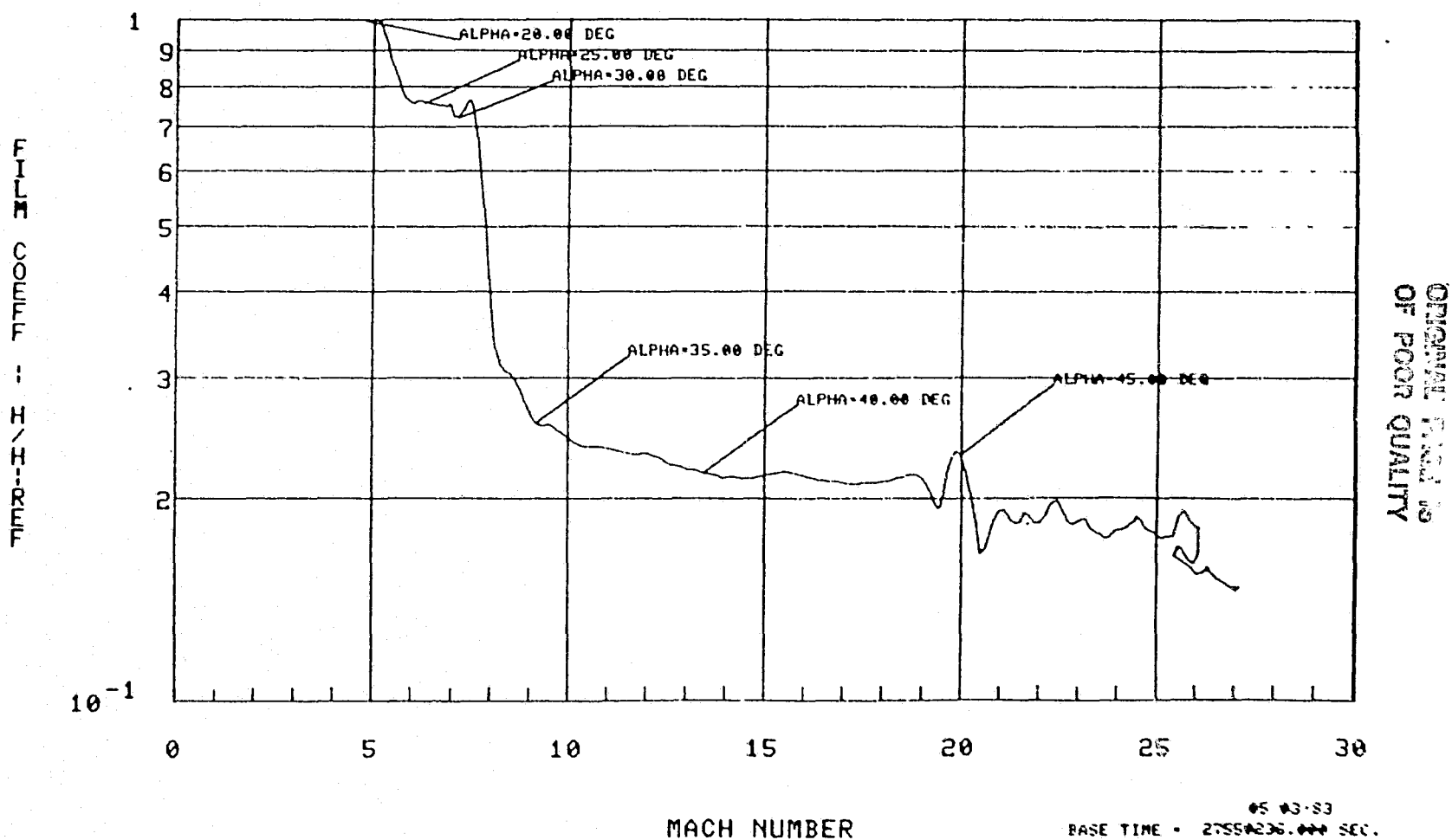


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B-28C

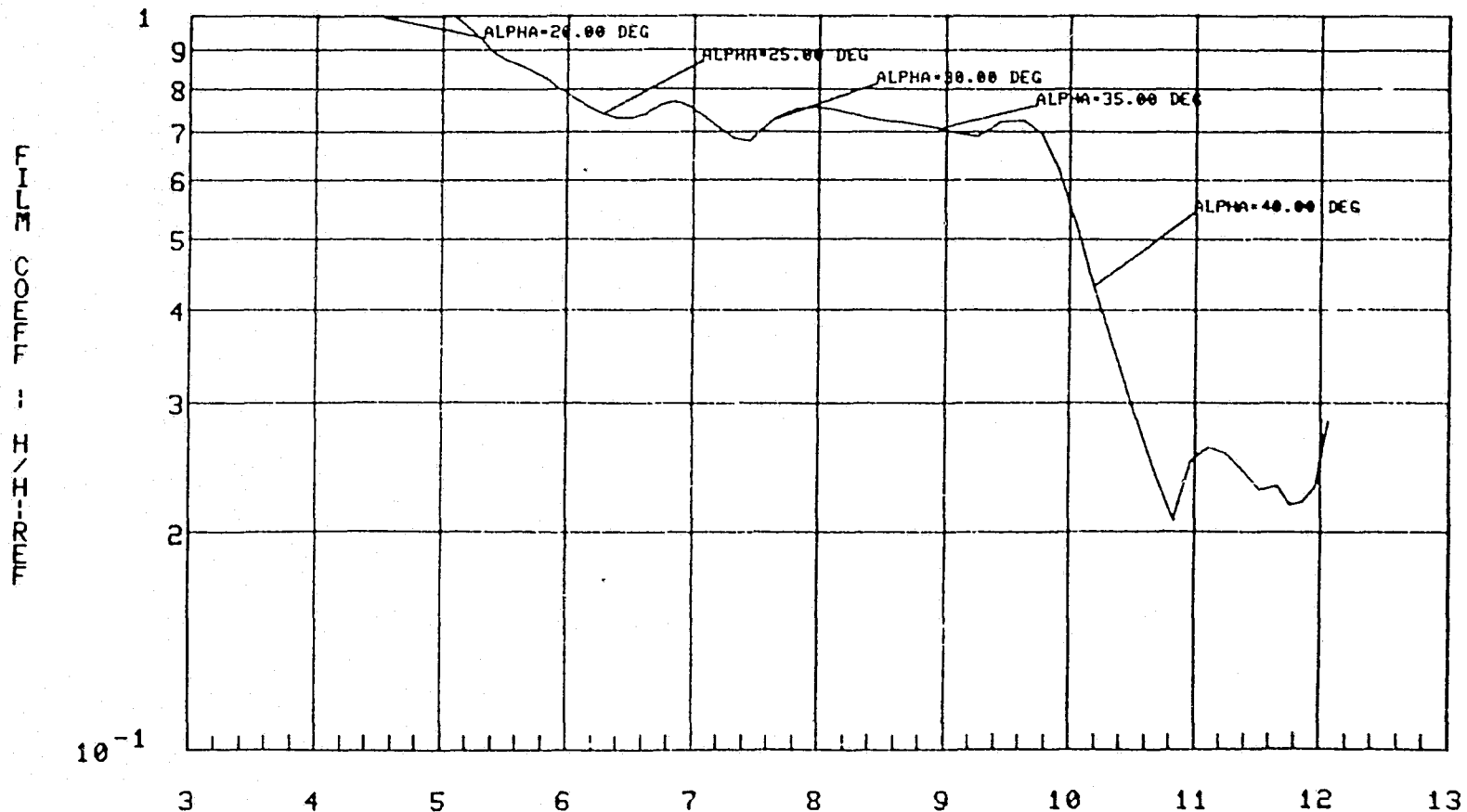
STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.15$

U07T9705A/H-REF 200-1480 SEC



STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.15$

U07T9705A/H-REF 965-1300 SEC



MACH NUMBER

#5 #3 S3
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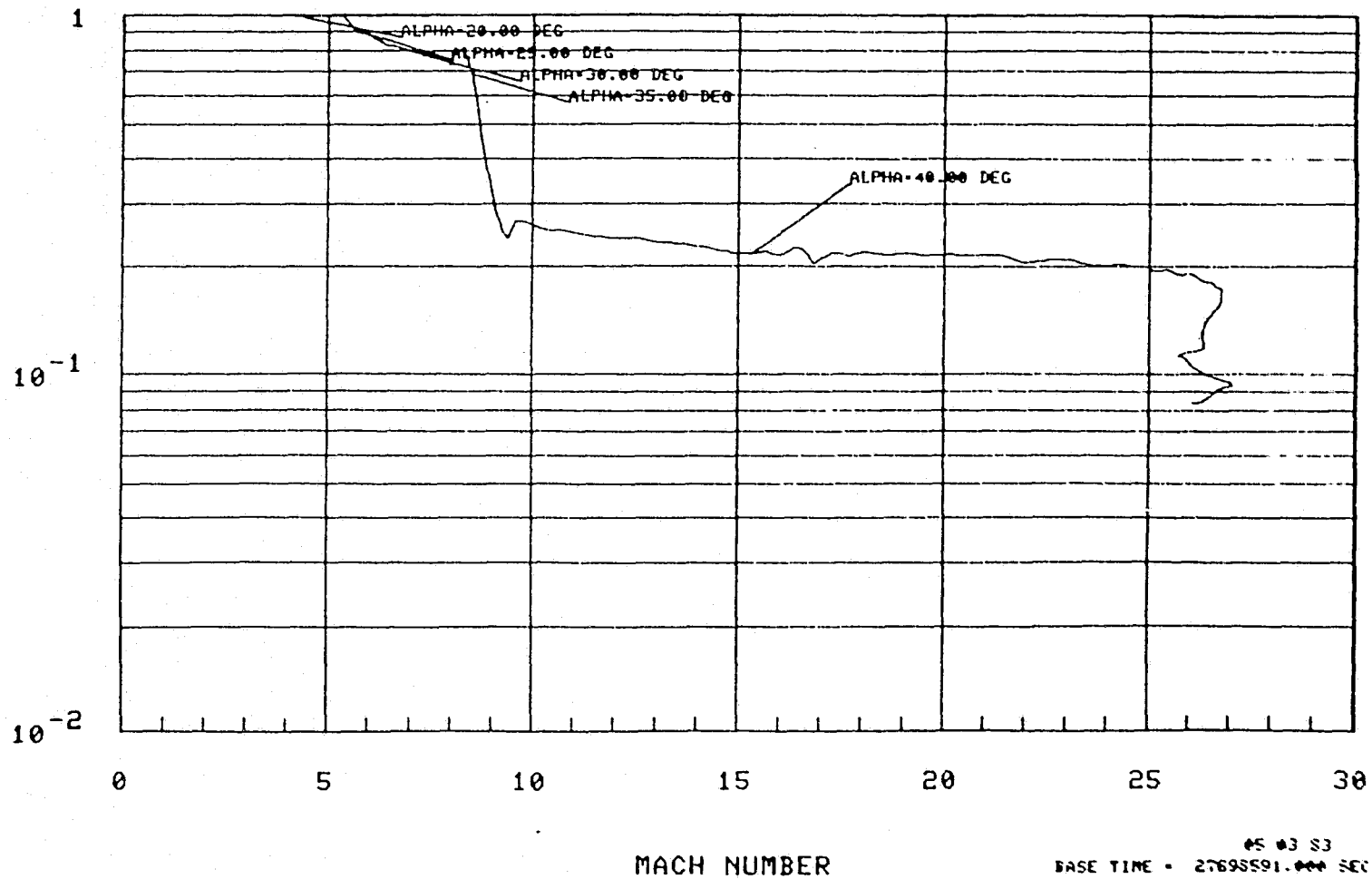
B-282

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.15

U87T9705A/H-REF 150-1350 SEC

FILE C00001 - H-REF

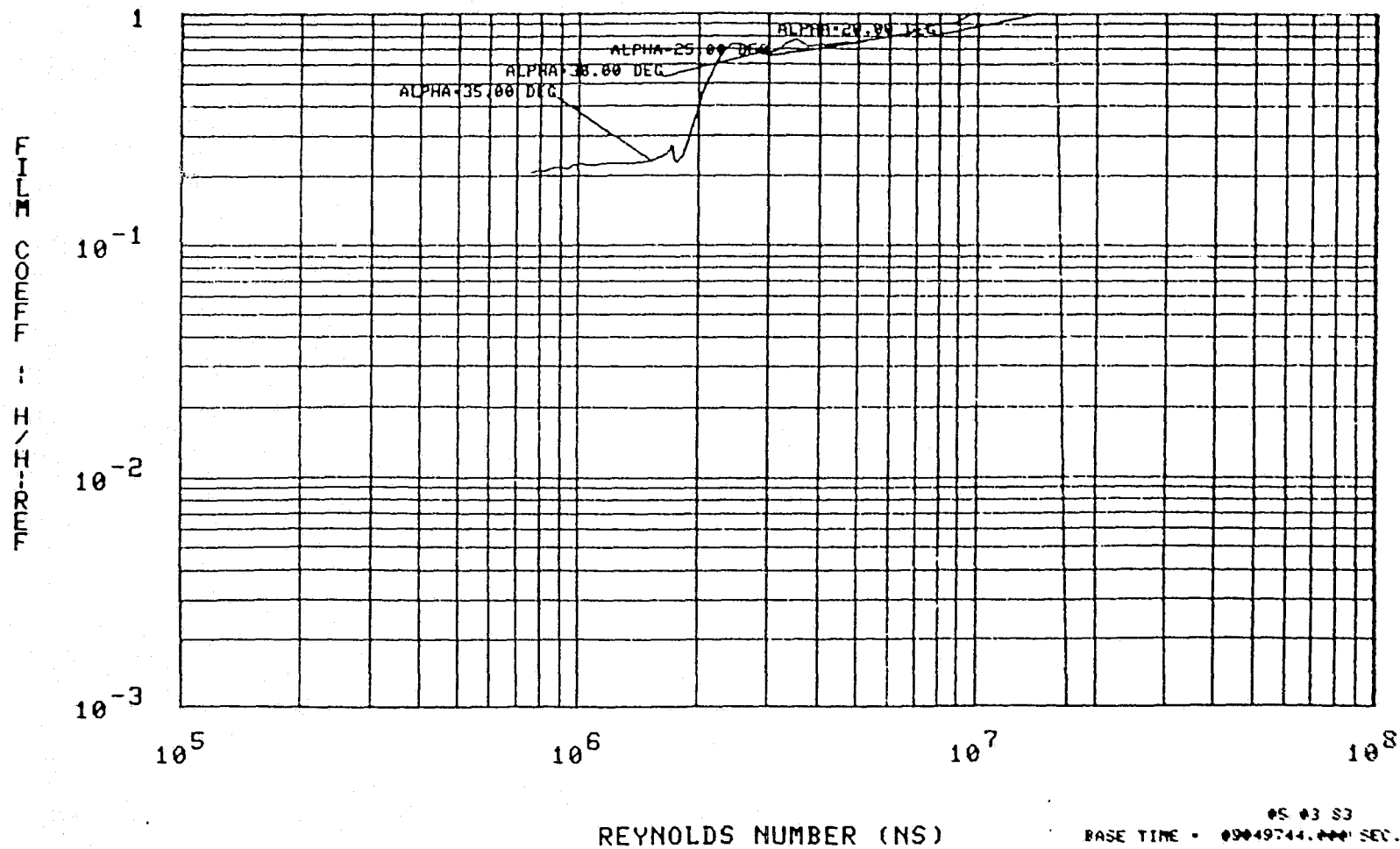
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B-283

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.15

U07T9705A/H-REF 1065-1460 SEC

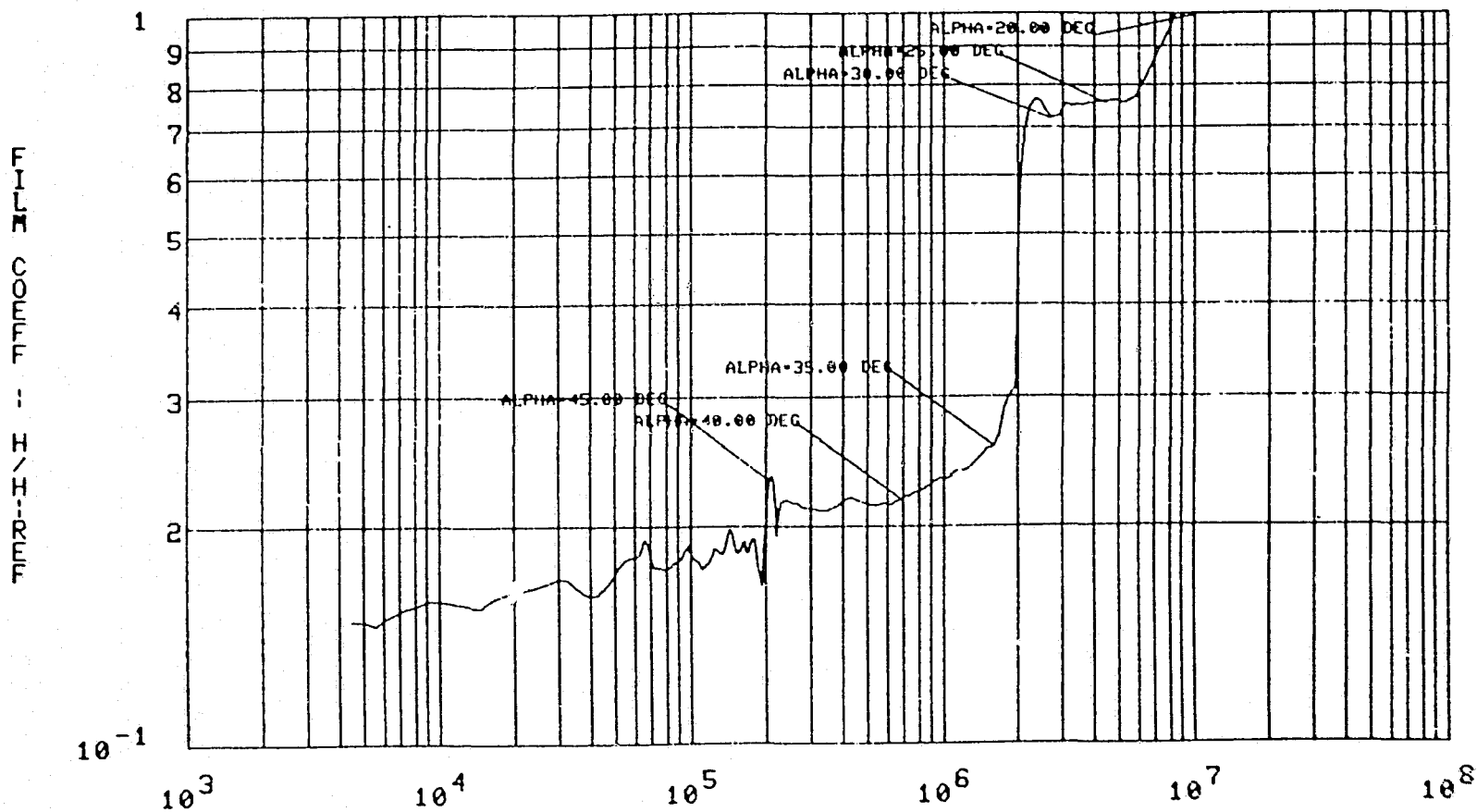


B-284

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U07T9705A/H-REF 200-1480 SEC



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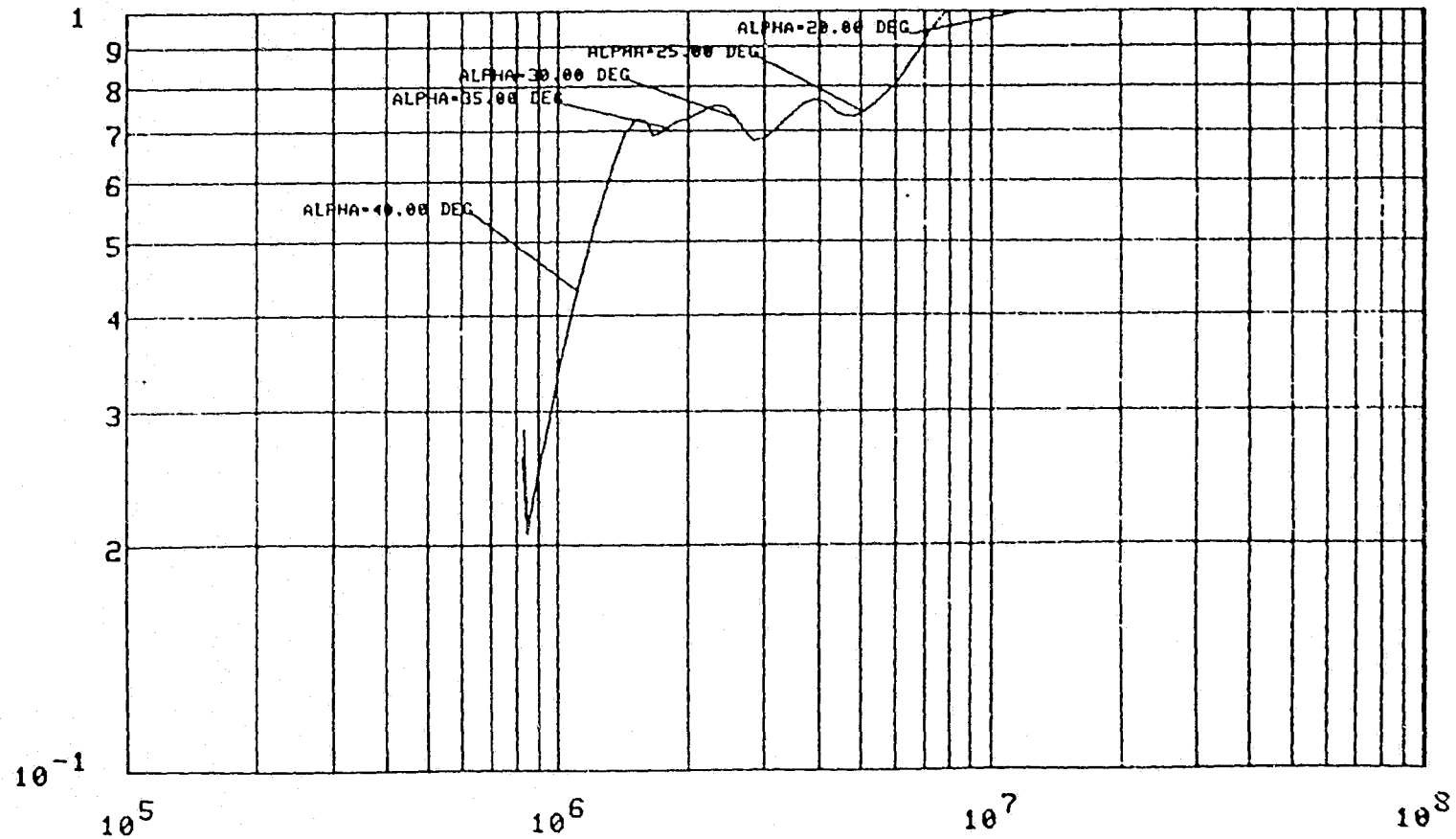
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U07T9705A/H-REF 965-1300 SEC

FILE COWELL : H/H-REF

B-286

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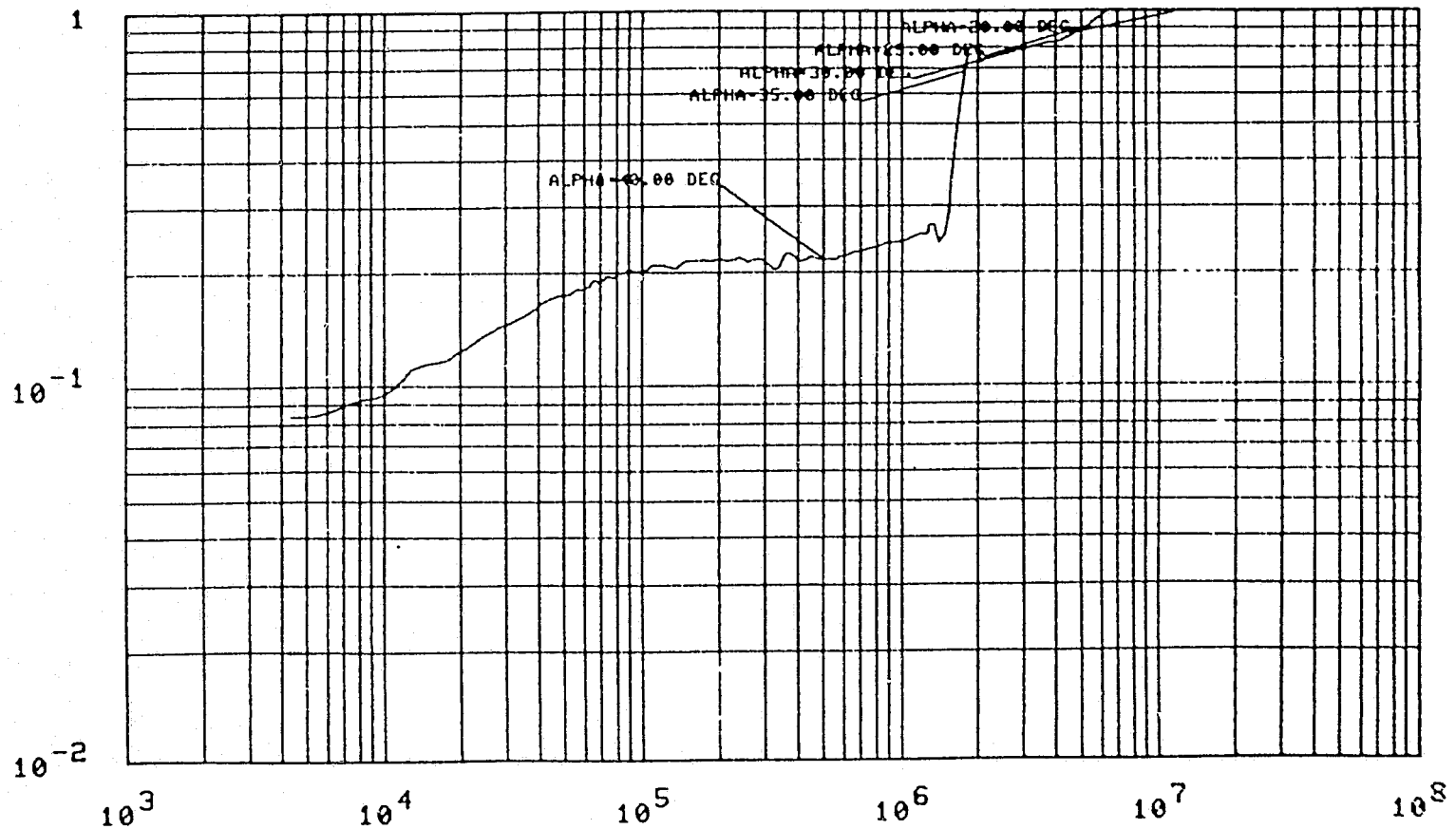
REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME = 1604023.000 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.15

U07T9705A/H-REF 150-1350 SEC

FILE CODE -- H-H-R-LL



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B-287

REYNOLDS NUMBER (NS)

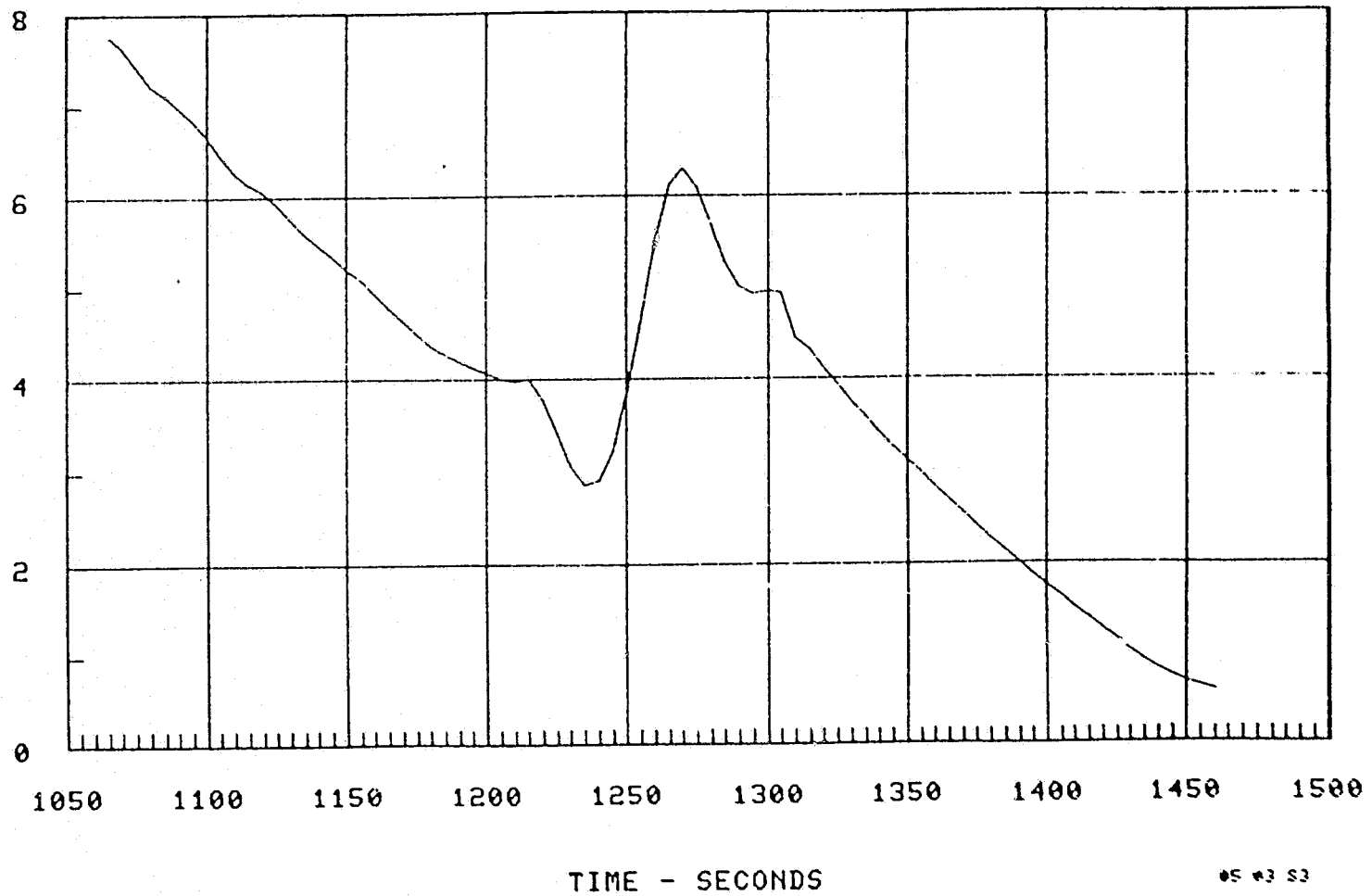
05 03 S3
BASE TIME = 27695591.000 SEC.

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.15$

U87T9705A

HEADING RATE - BR/DEGREES - SEC

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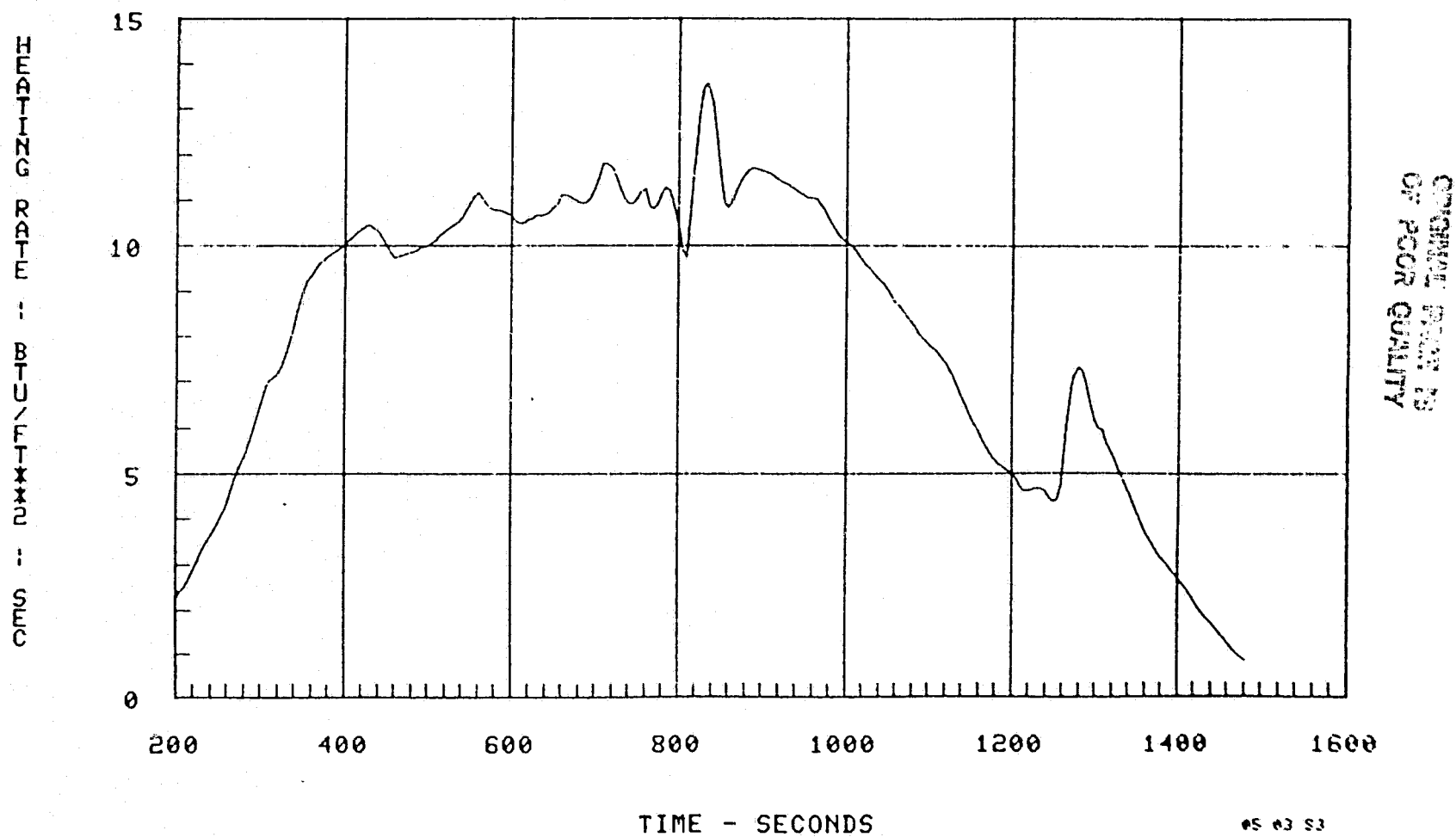


B-288

05 43 53

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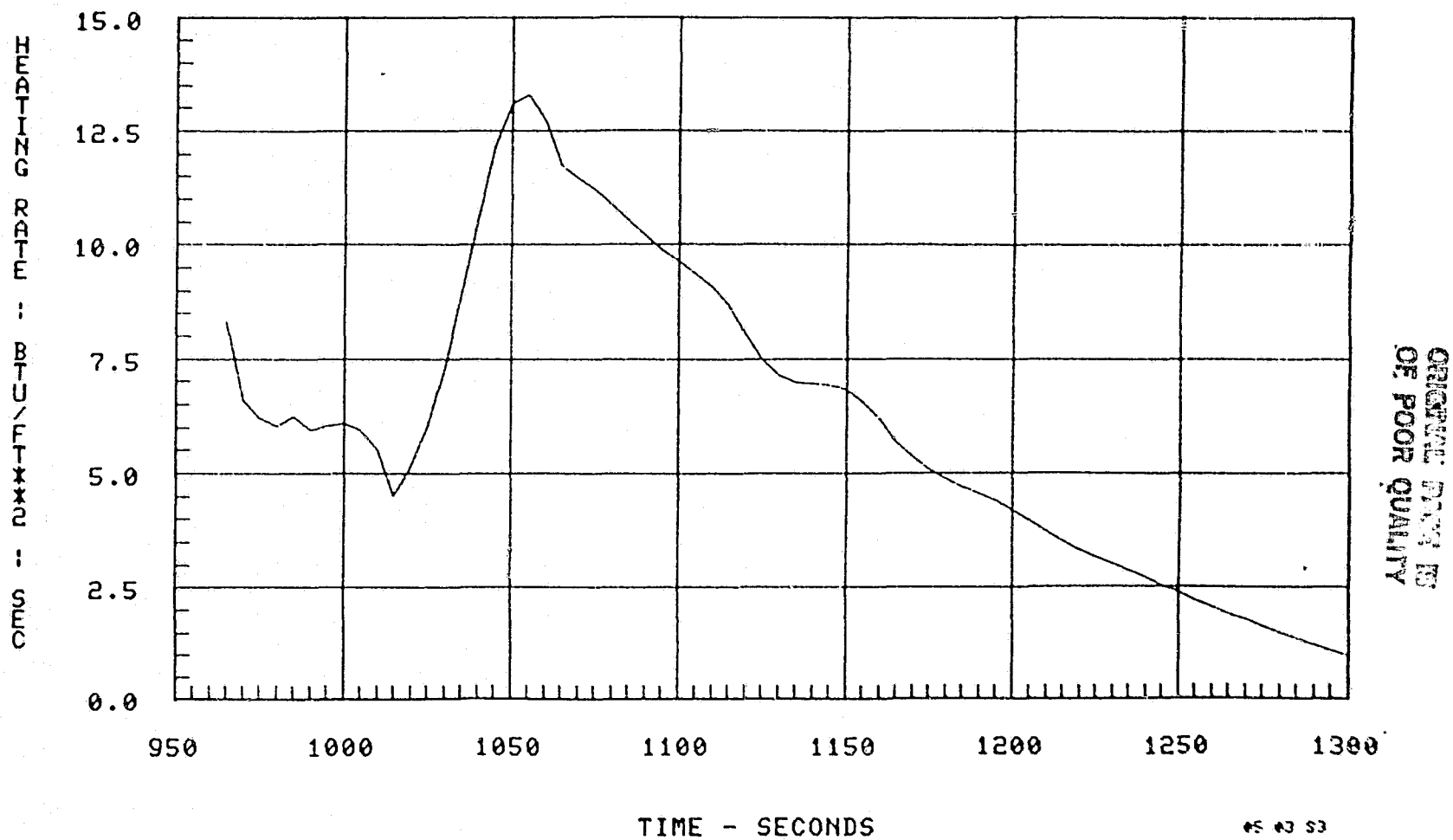
U07T9705A



B-289

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.15

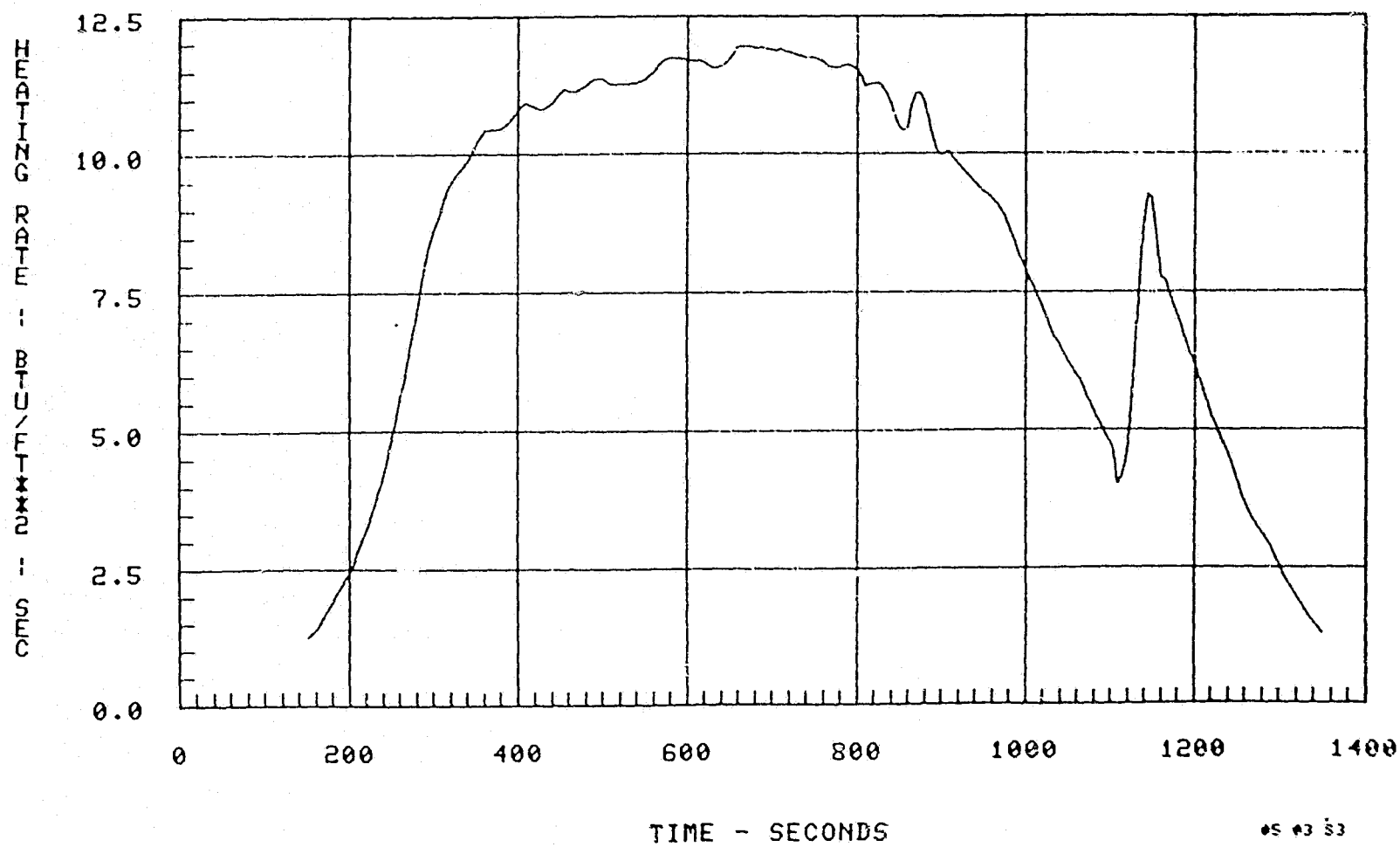
U07T9705A



B-290

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.15

U87T9705A



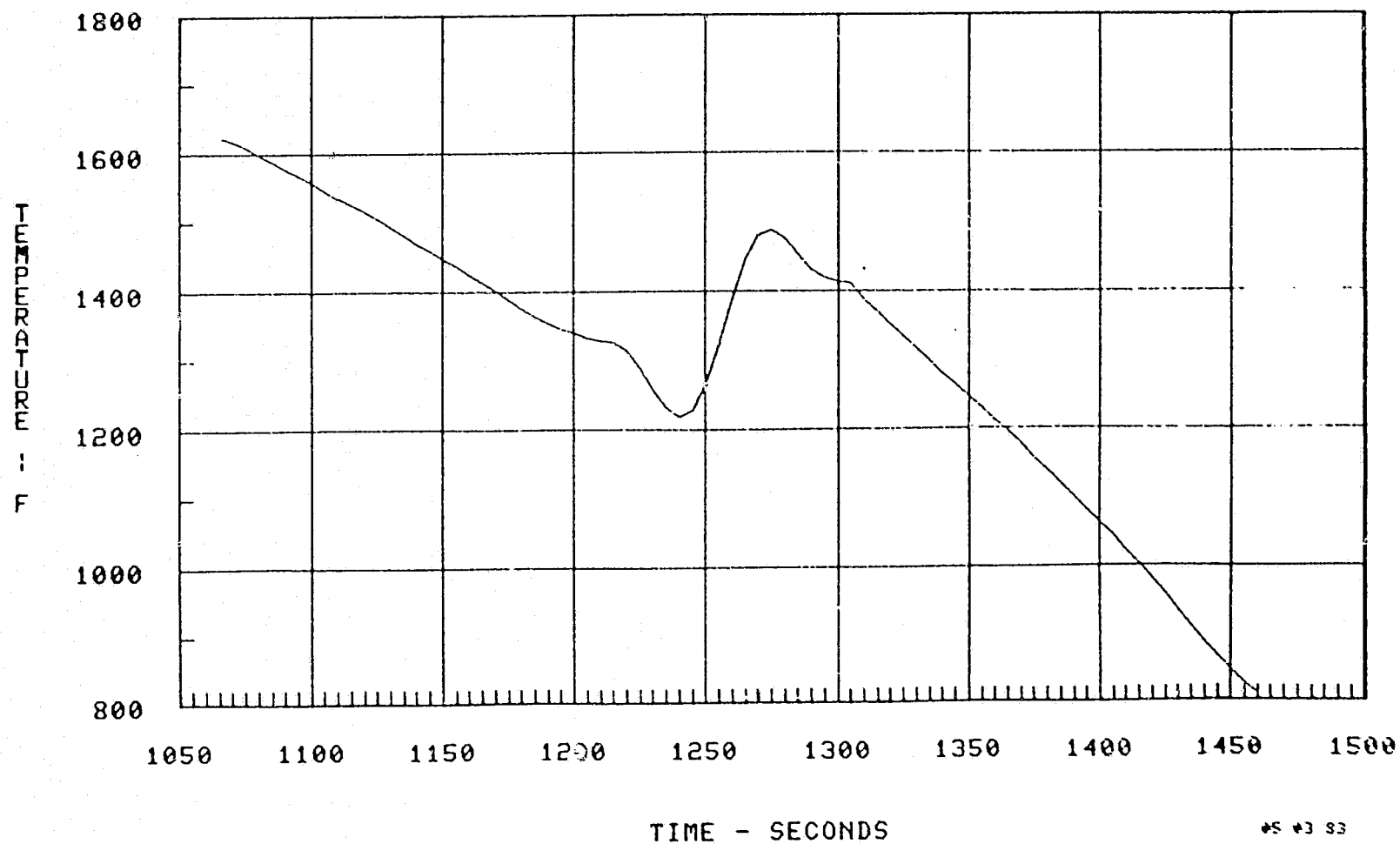
B-291

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45 43 33

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.15$

U07T9705A

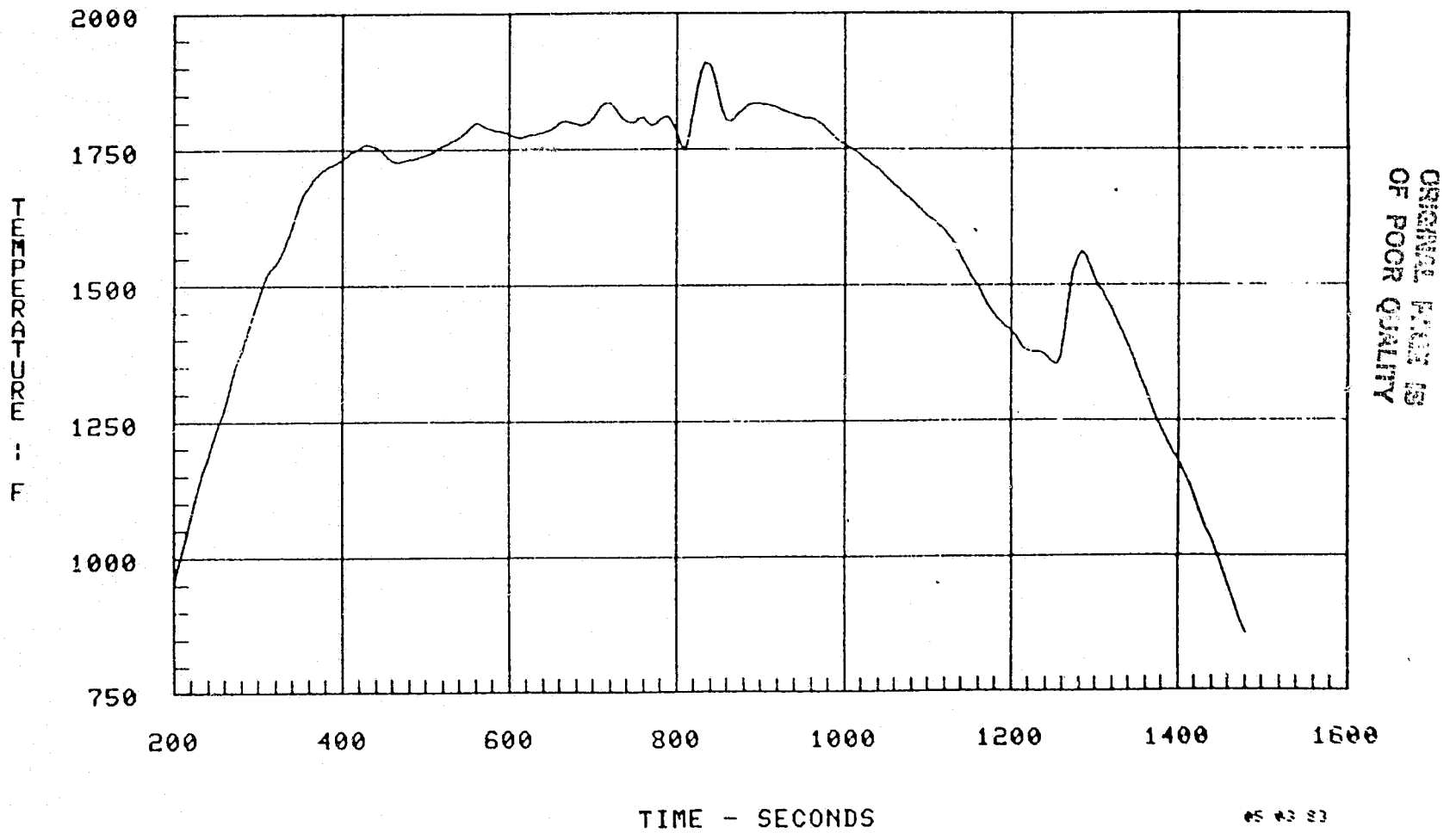


B-292

*S *J 33

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.15

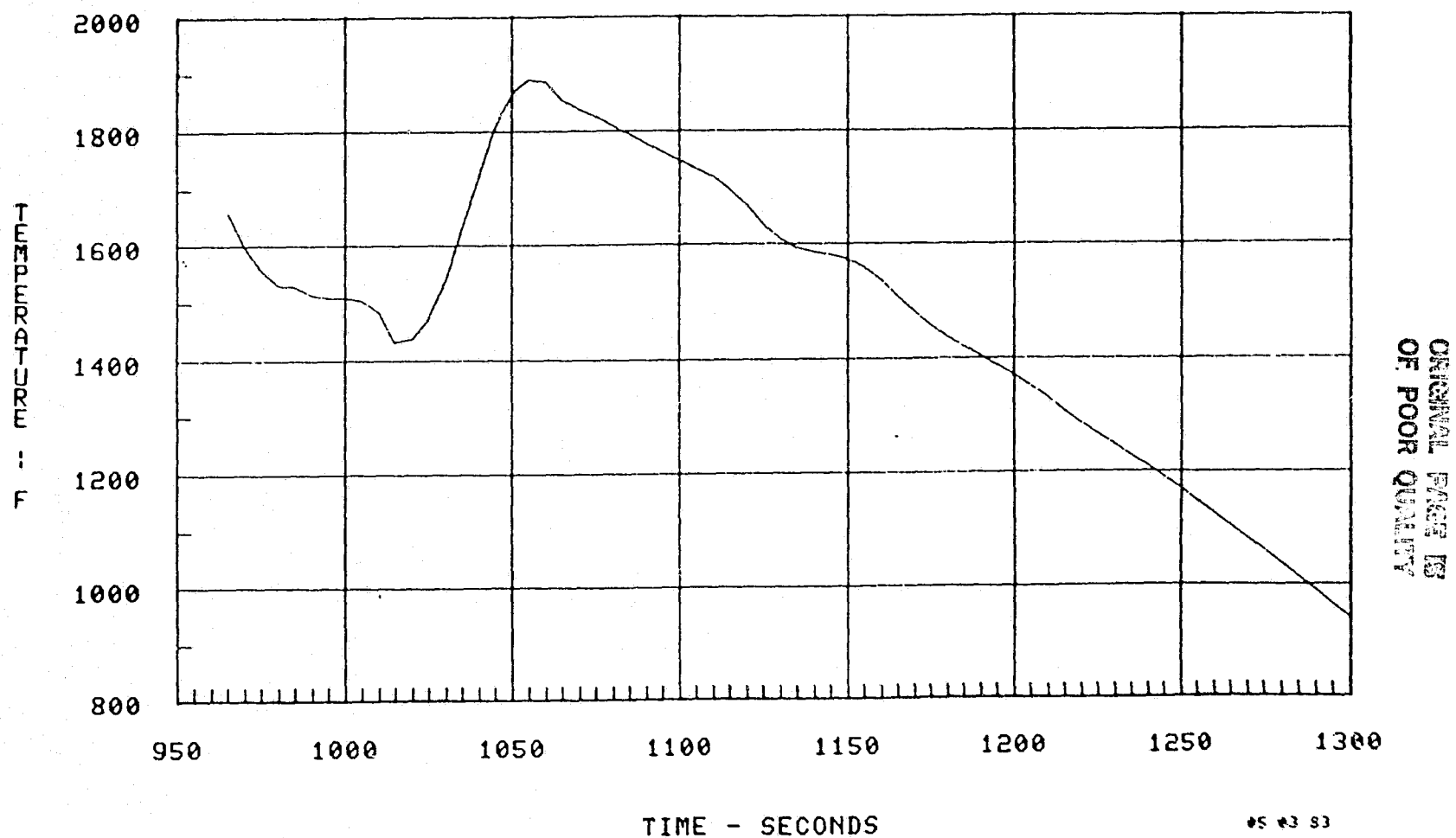
U07T9705A



B-293

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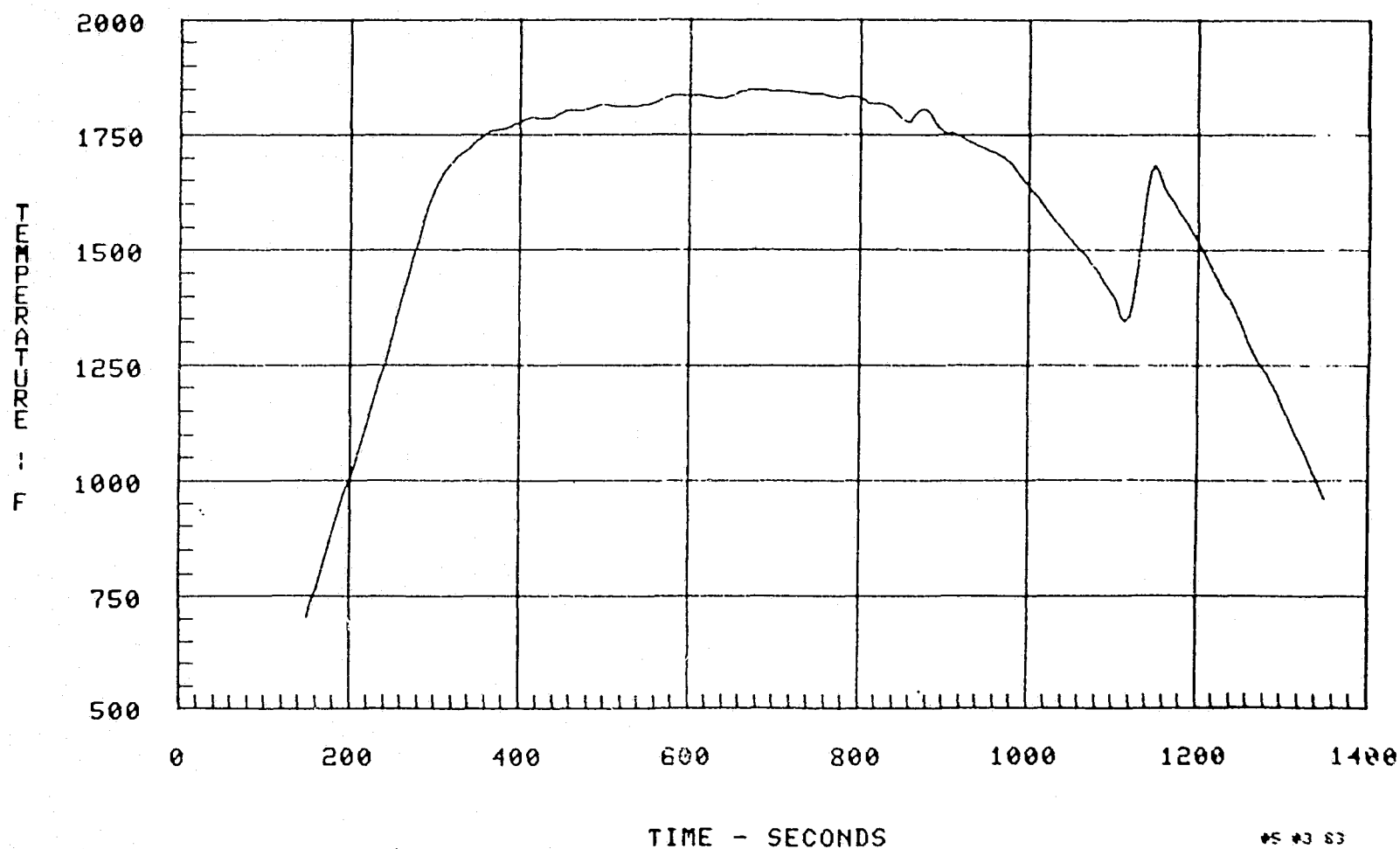
U07T9705A



B-294

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.15

U07T9705A

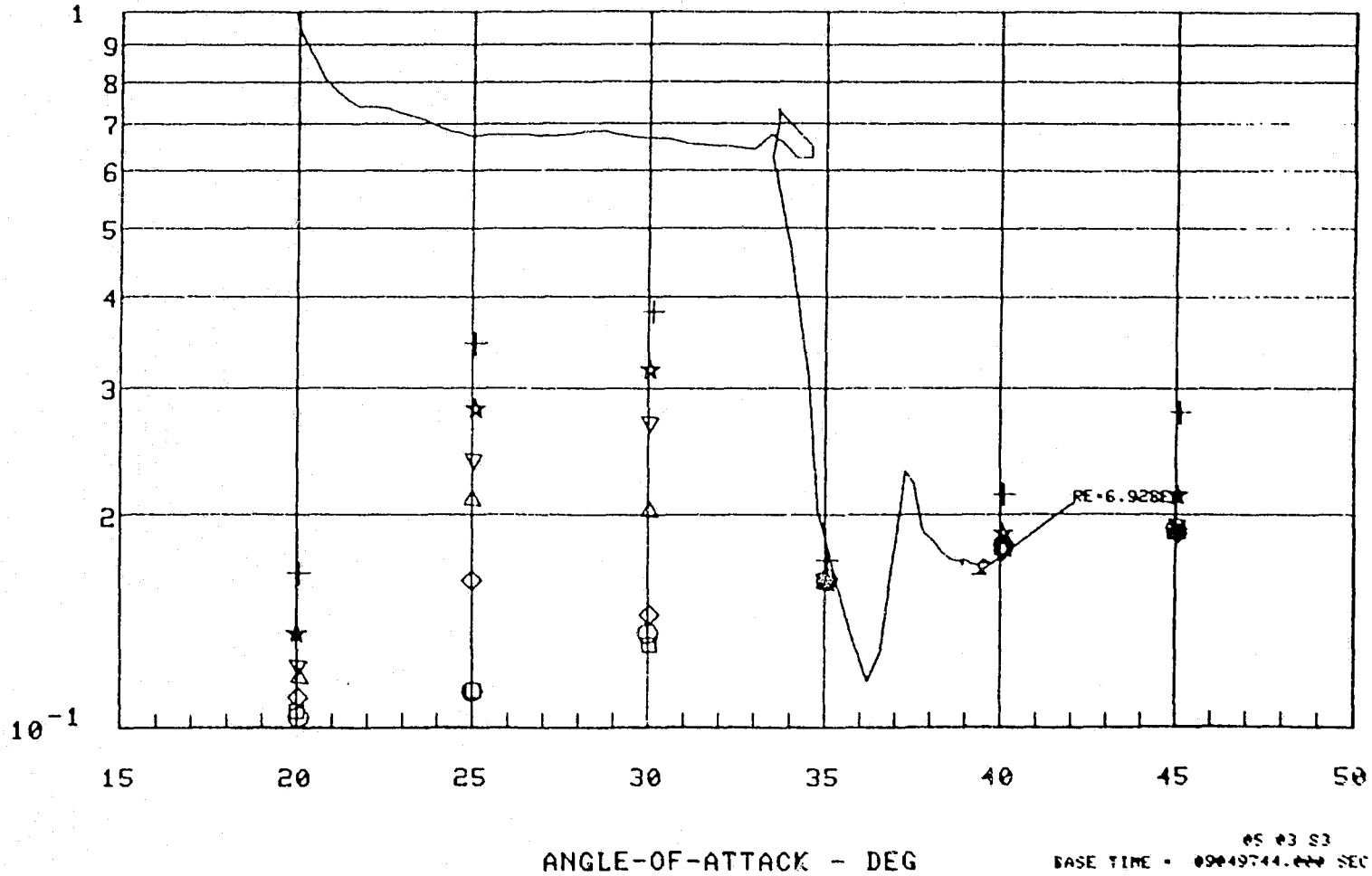


STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.28

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9707A/H-REF 1065-1460 SEC



B-296

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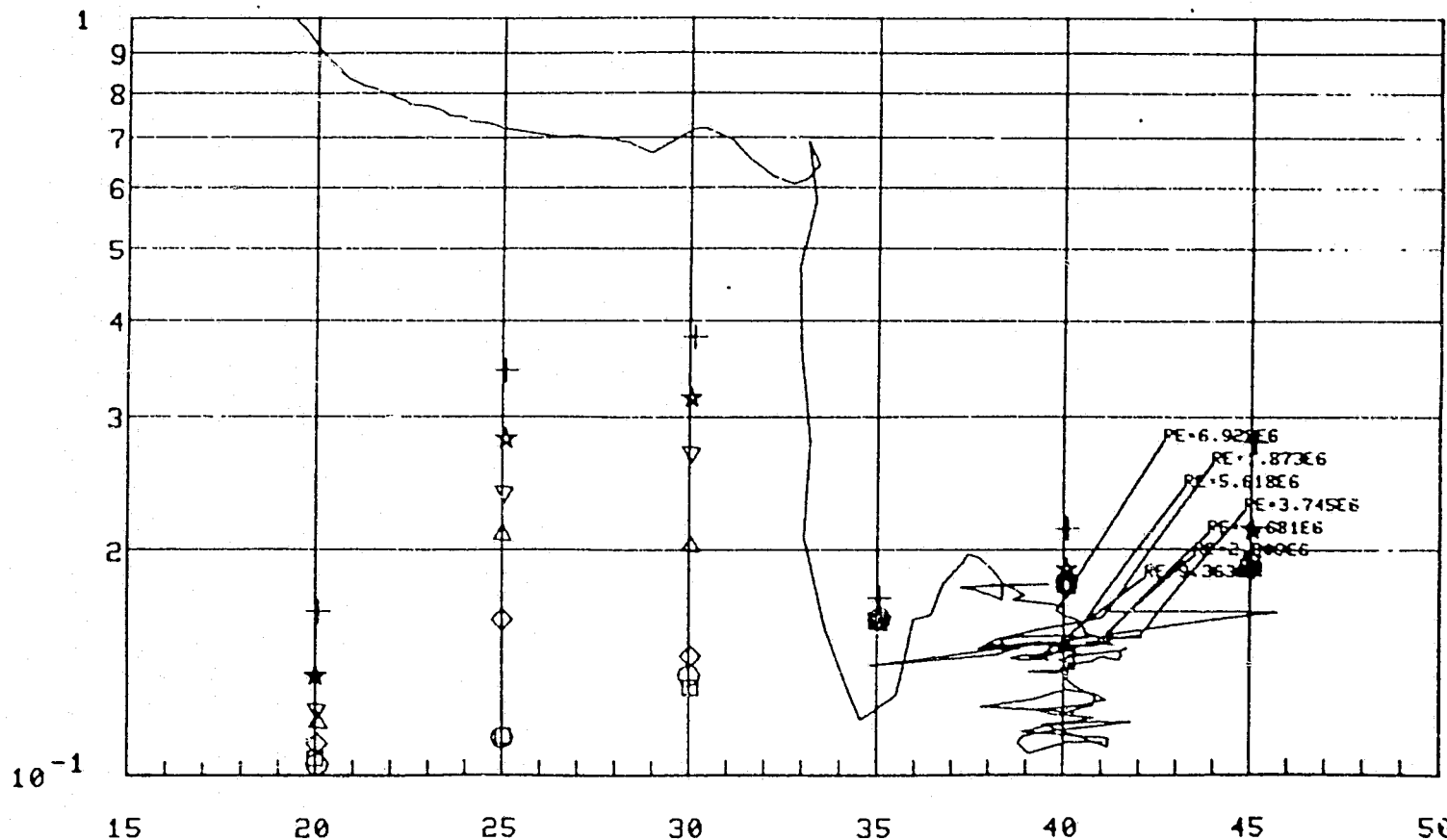
STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.28

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U87T9707A/H-REF 200-1480 SEC

FILE COMPLE -- H/H-REF



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ANGLE-OF-ATTACK - DEG

BASE TIME * 27550236.000 SEC.

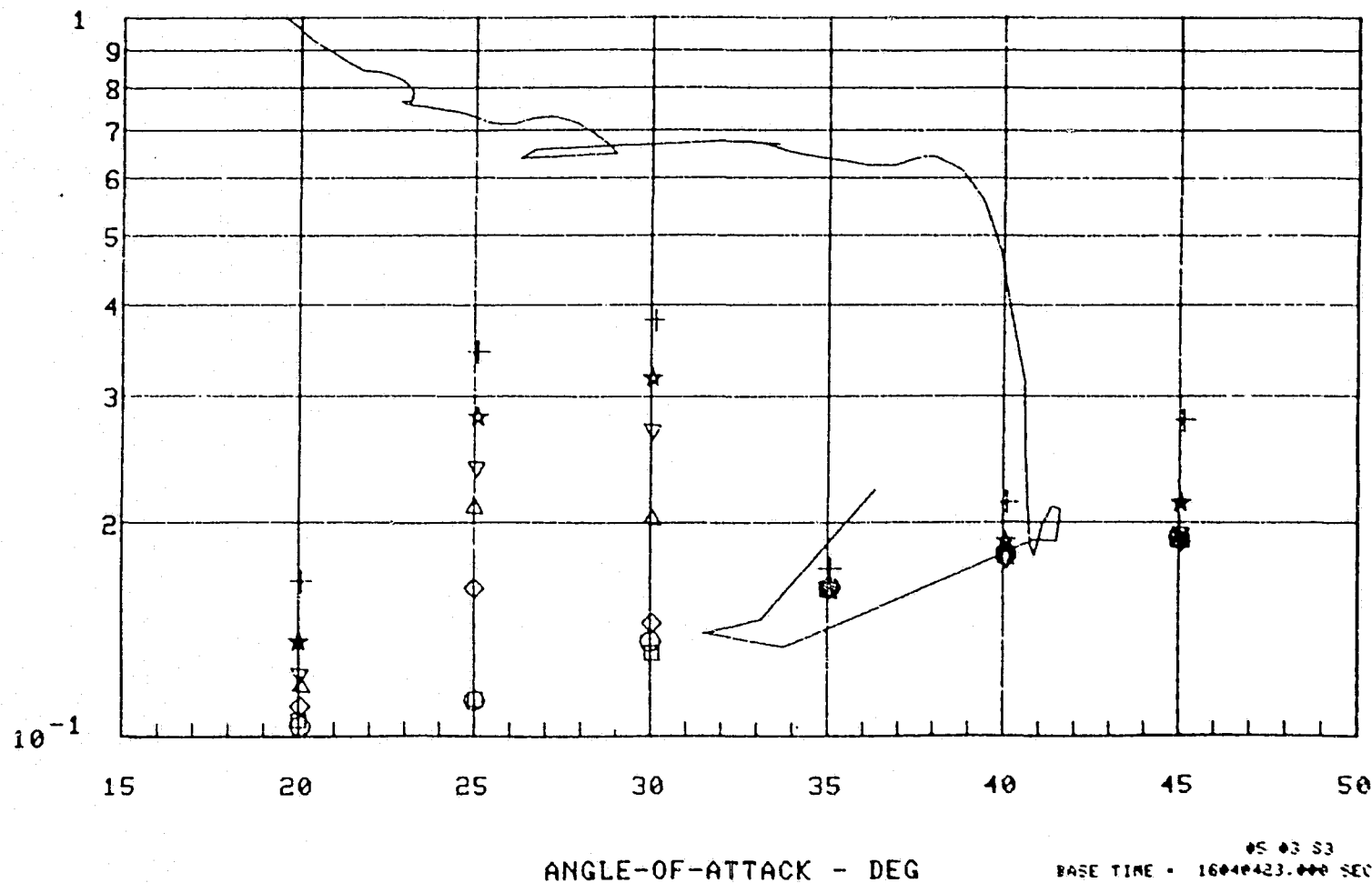
STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.28

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0H39 0.0175 SCALE RE * 0.5 E06
0H39 0.0175 SCALE RE * 1.0 E06
0H39 0.0175 SCALE RE * 1.5 E06
0H39 0.0175 SCALE RE * 2.0 E06
0H39 0.0175 SCALE RE * 2.5 E06
0H39 0.0175 SCALE RE * 3.0 E06
0H39 0.0175 SCALE RE * 3.7 E06

U07T9707A/H-REF 965-1300 SEC

FILE COUPLER - H/H-REF



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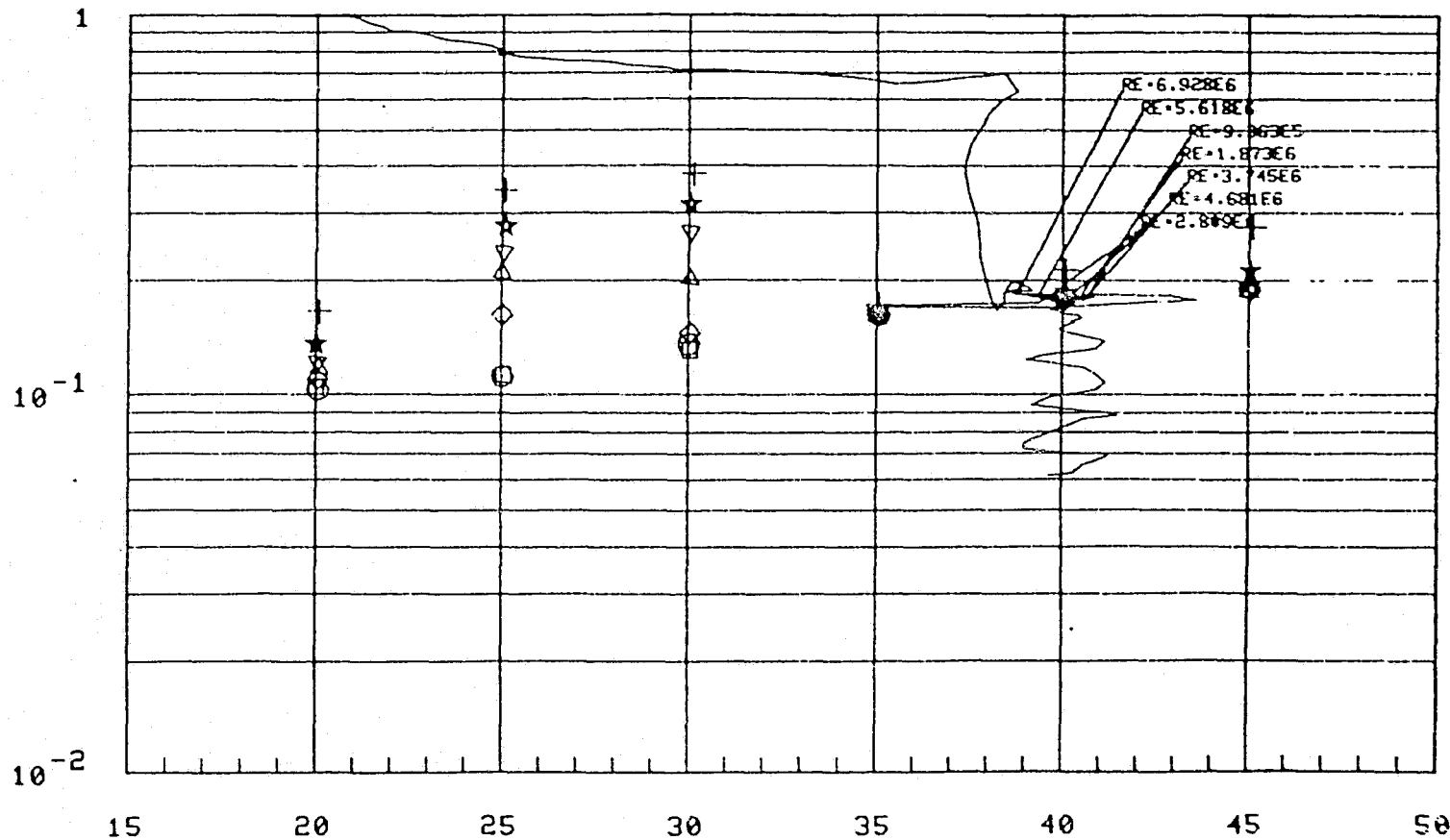
STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.28

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9707A/H-REF 150-1350 SEC

WING COEFFICIENT - H/I-RULL



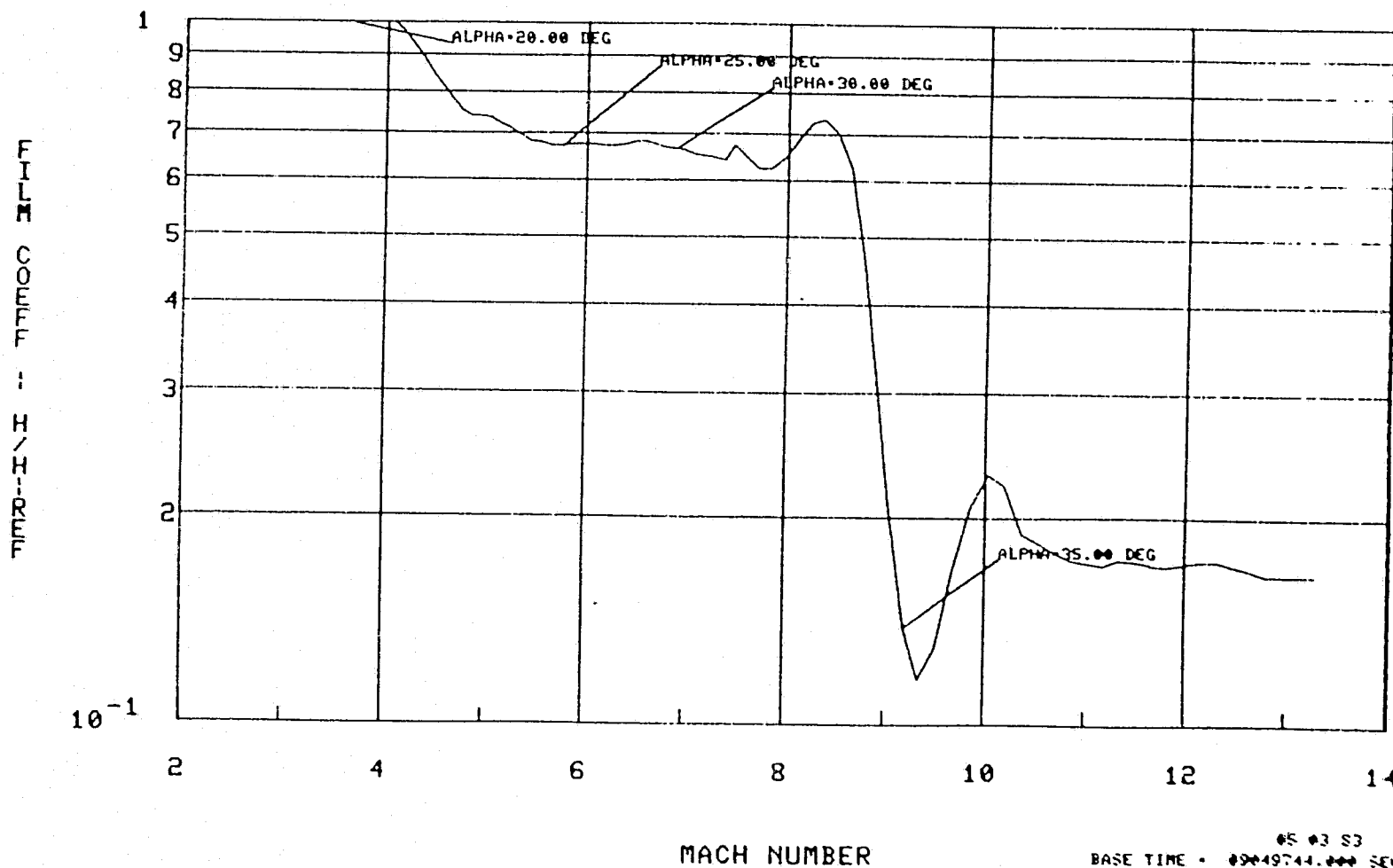
ANGLE-OF-ATTACK - DEG

05 03 53
BASE TIME = 27695591.444 SEC.

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STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

U07T9707A/H-REF 1065-1460 SEC



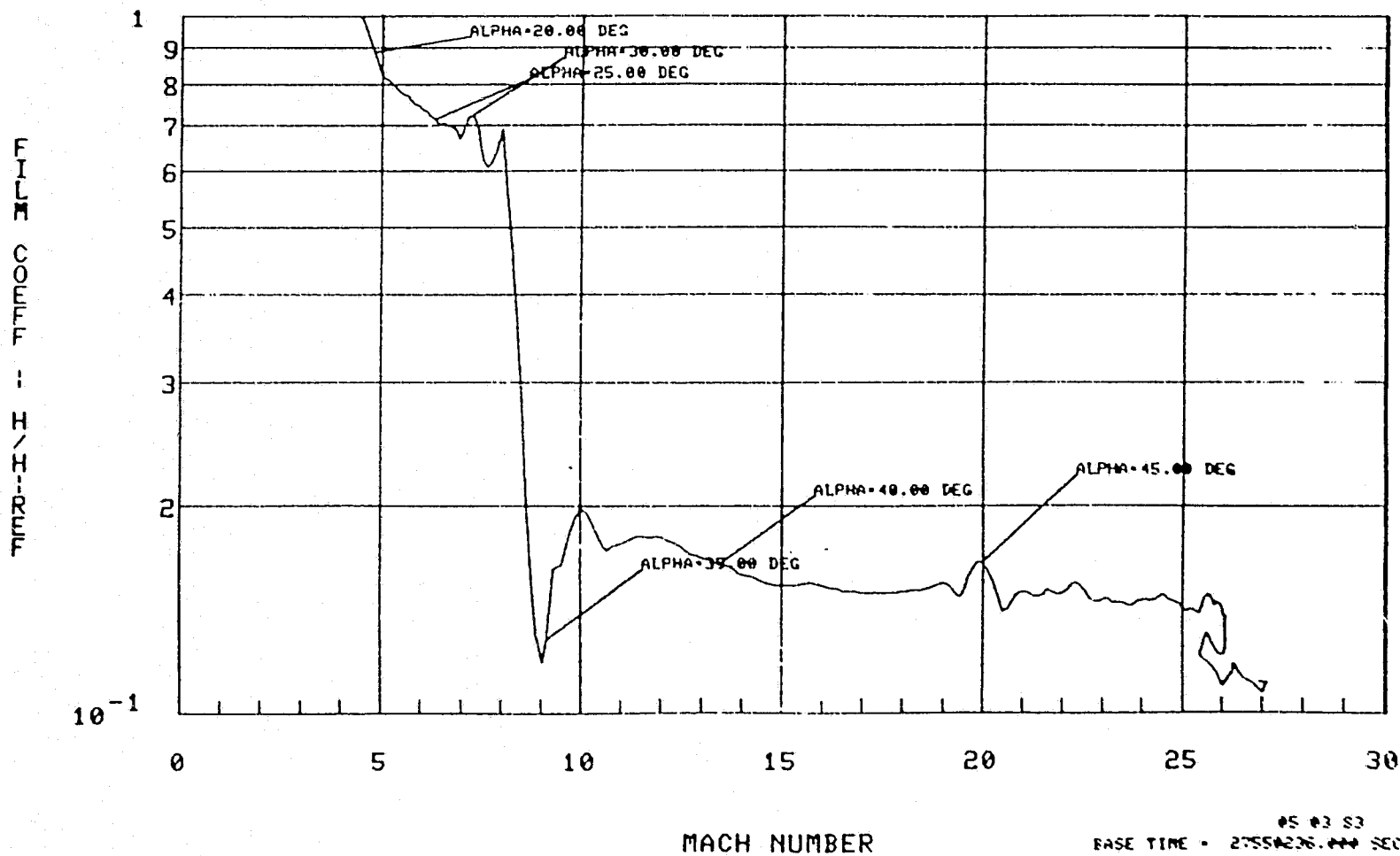
B-300

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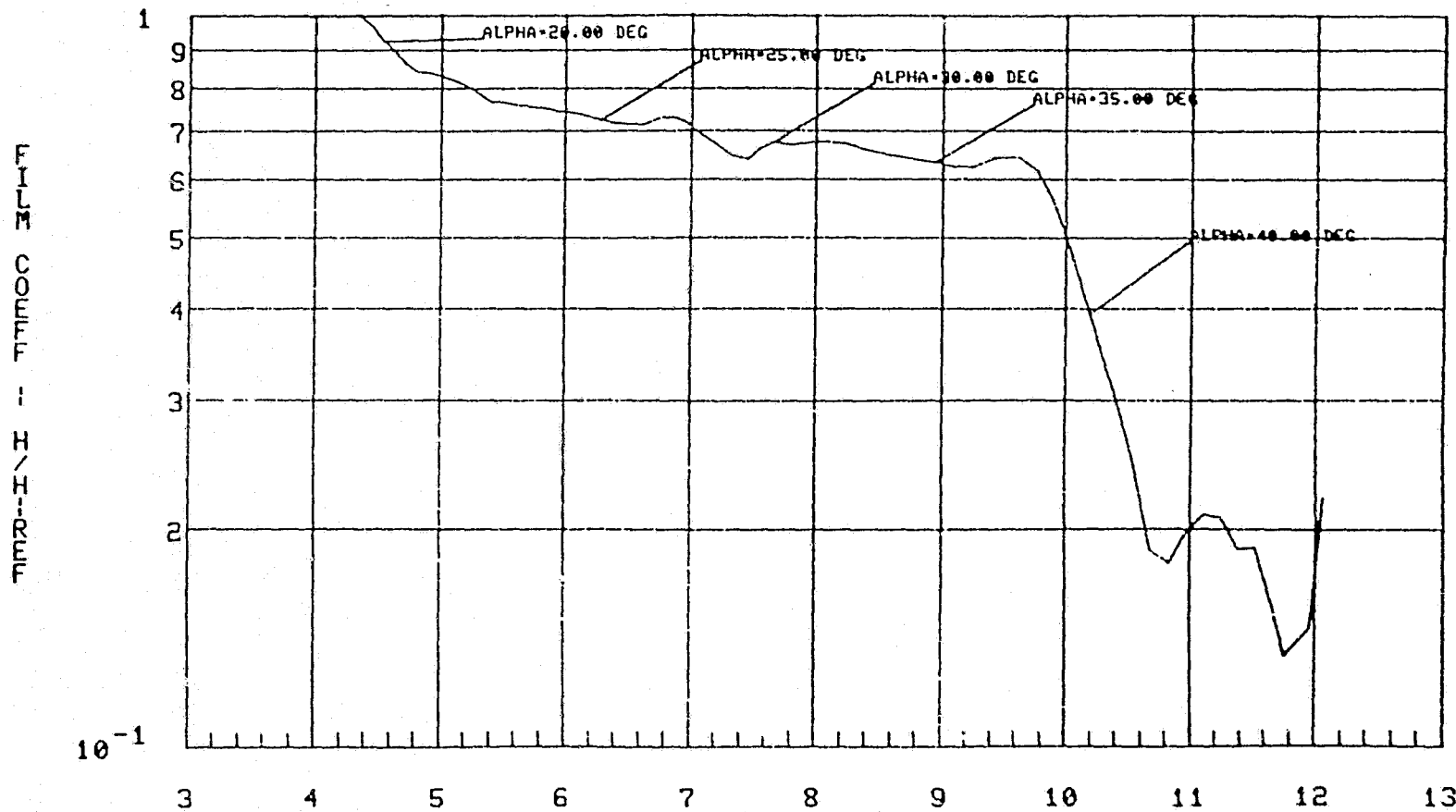
U07T9707A/H-REF 200-1480 SEC



B-301

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.28

U07T9707A/H-REF 965-1300 SEC



B-302

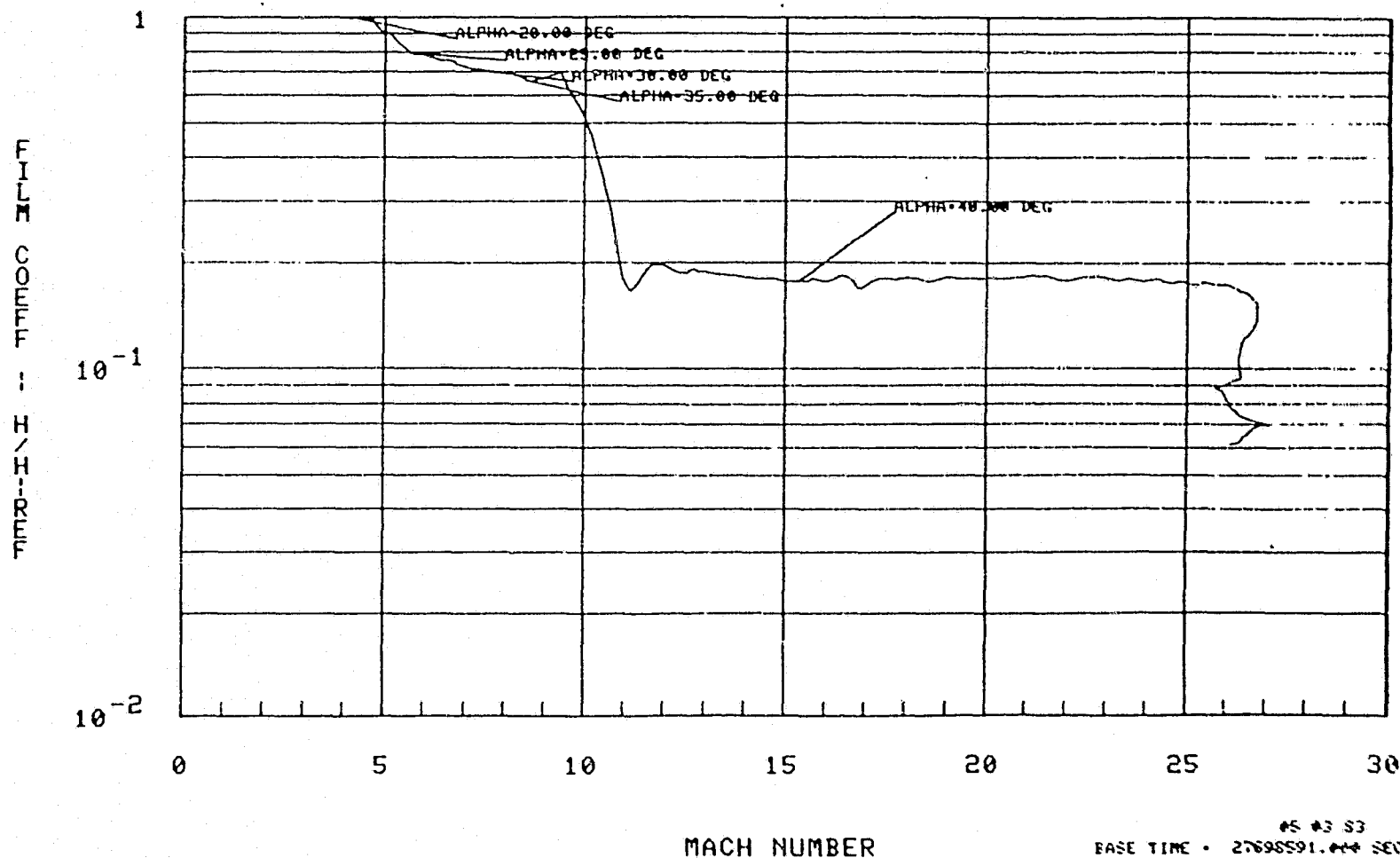
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MACH NUMBER

05 03 S3
FASE TIME = 1604023.300 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.28

U07T9707A/H-REF 150-1350 SEC



B-303

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

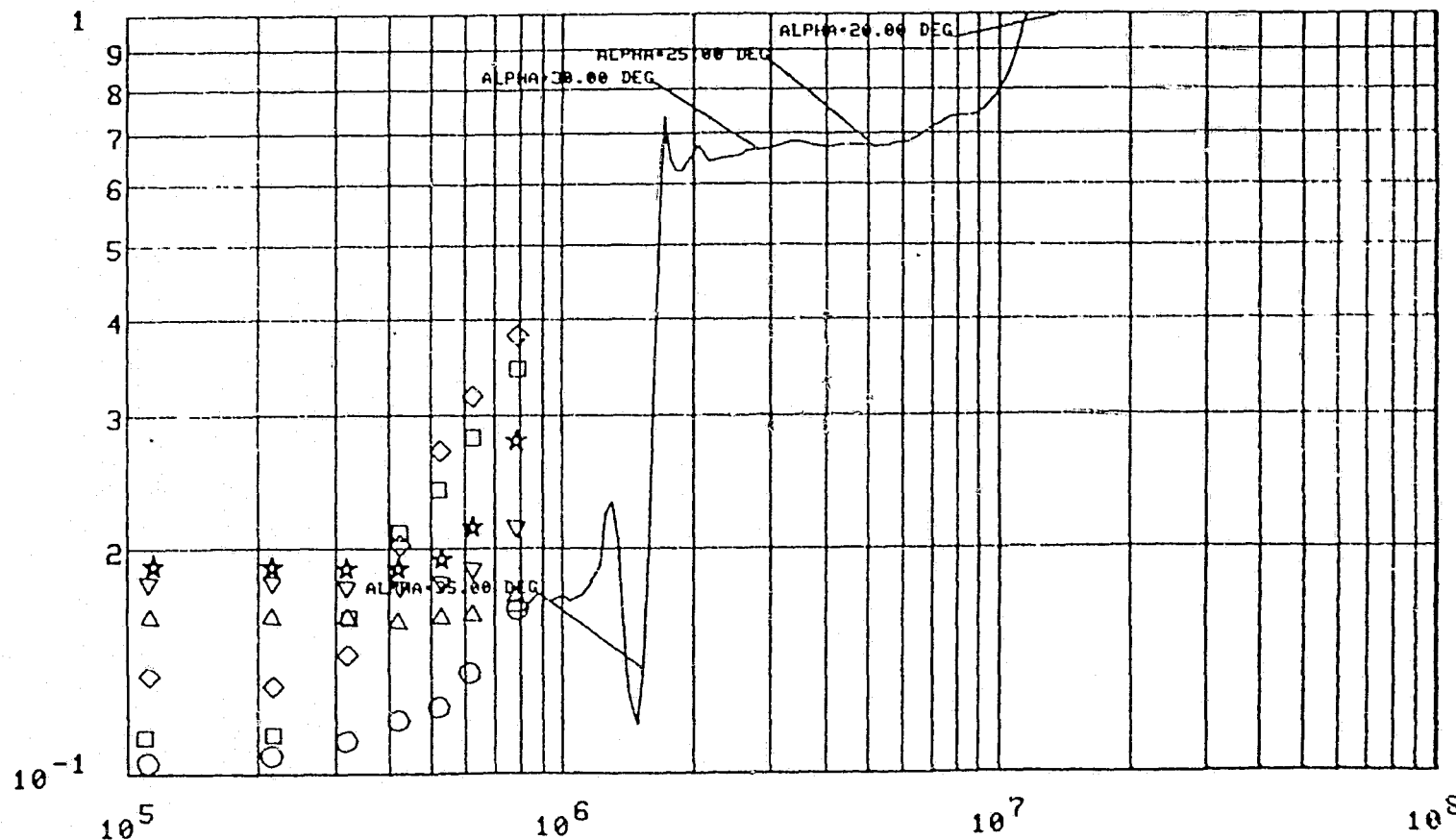
U07T9707A/H-REF 1065-1460 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

LINE CODE - H-H-000

B-304



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REYNOLDS NUMBER (NS)

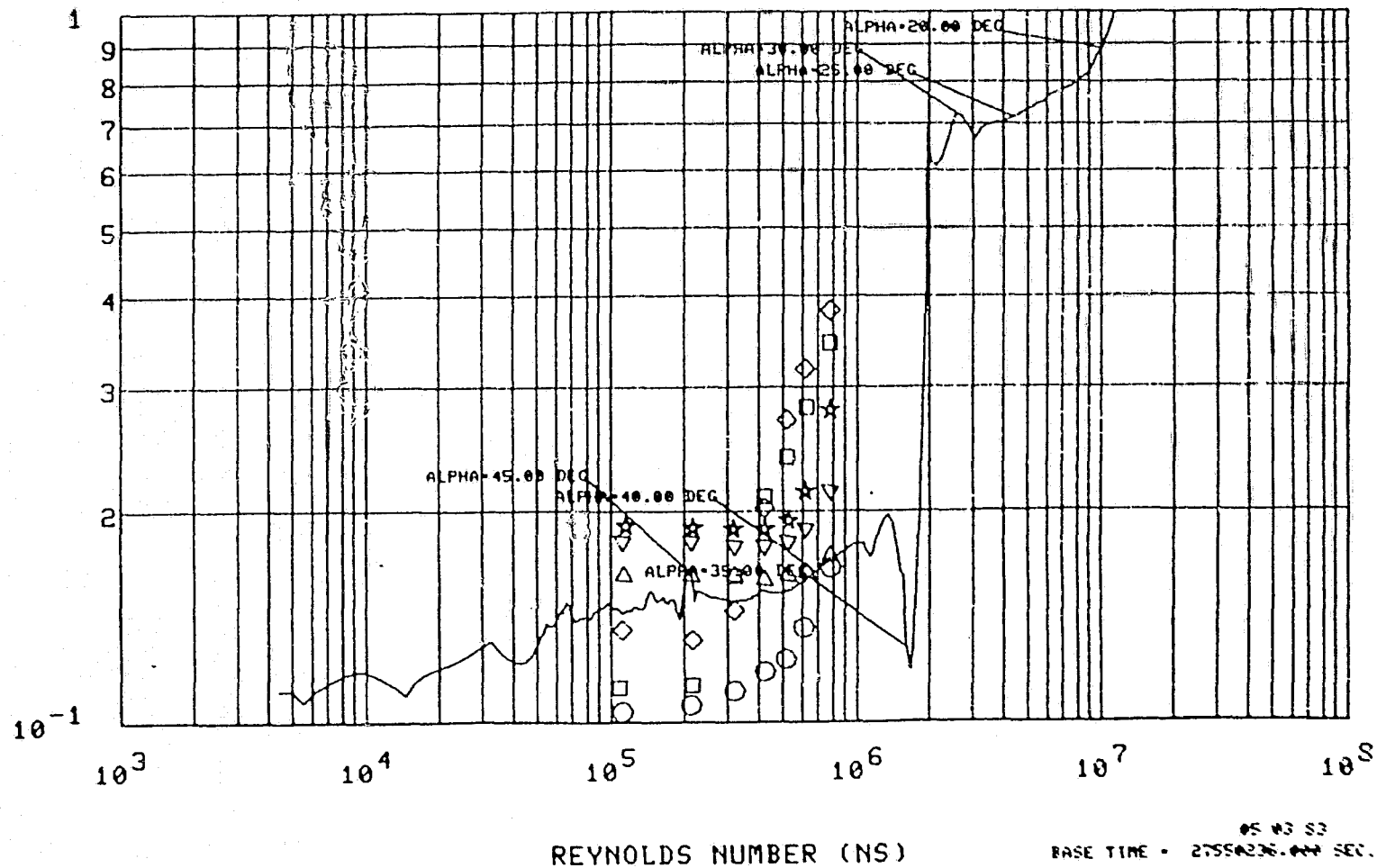
05 #3 S3
BASE TIME - 09:49:44.000 SEC.

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.28

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9707A/H-REF 200-1480 SEC



B-305

LIFT COEFFICIENT - IN-FLIGHT

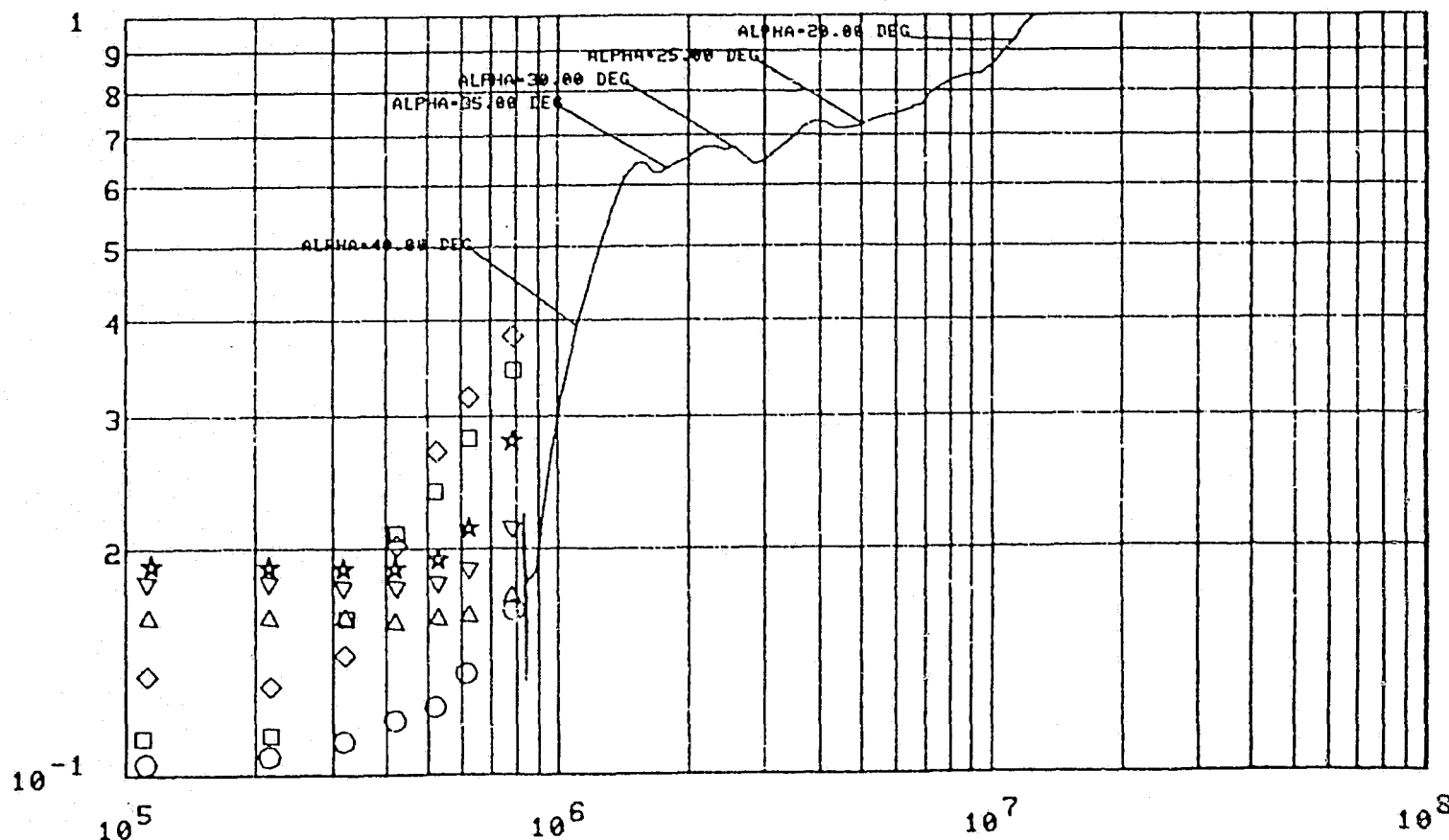
STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9707A/H-REF 965-1300 SEC

FILE CODE - H-REF



REYNOLDS NUMBER (NS)

05 03 53
BASE TIME - 10040423.000 SEC.

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B-306

C-5

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

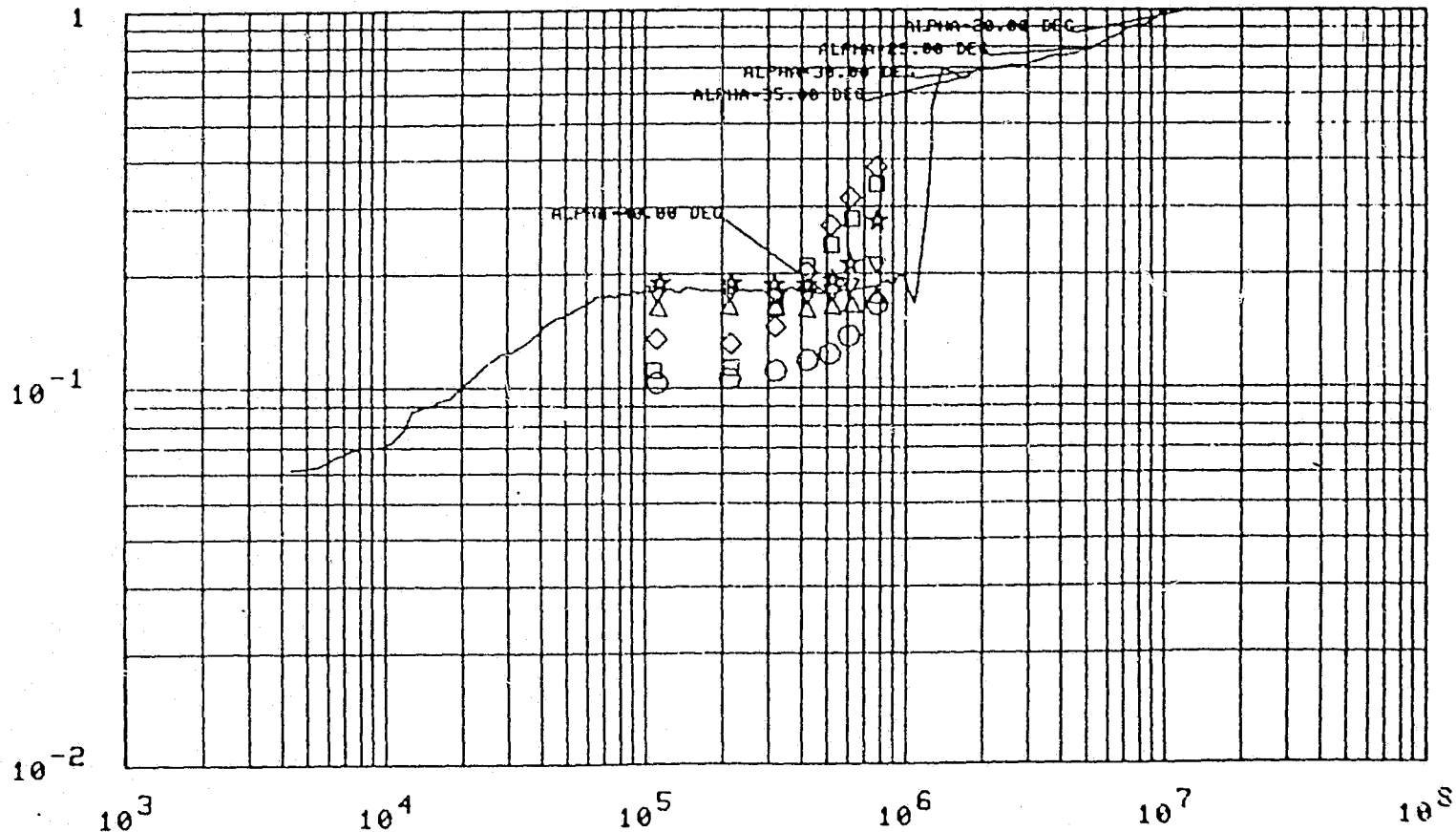
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9707A/H-REF 150-1350 SEC

FILE CODE: H-H-0000

B-307



REYNOLDS NUMBER (NS)

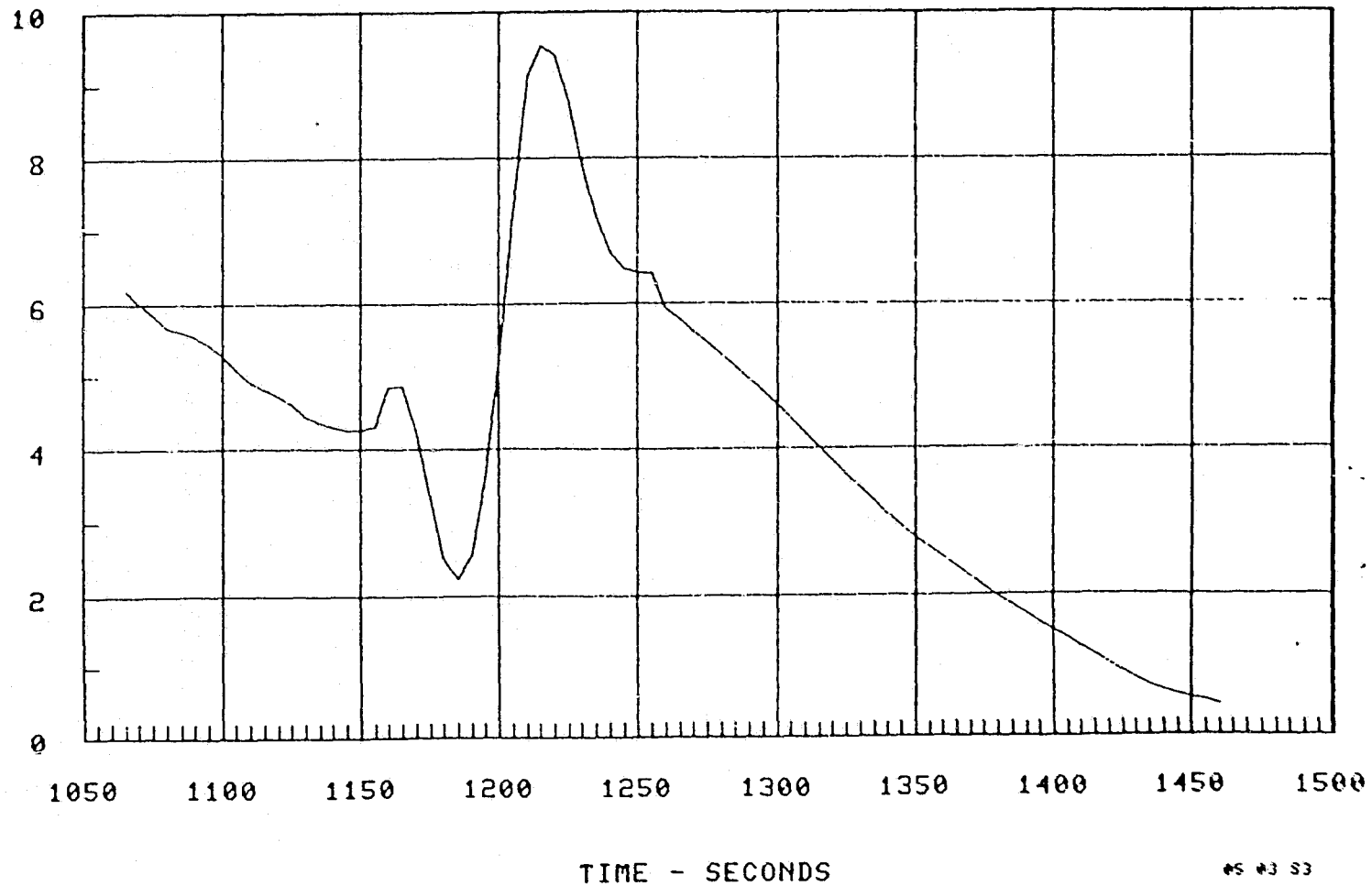
PS #3 S3
BASE TIME = 27695591.444 SEC.

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STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

U07T9707A

HEATING RATE : BTU/FT**2 : SEC



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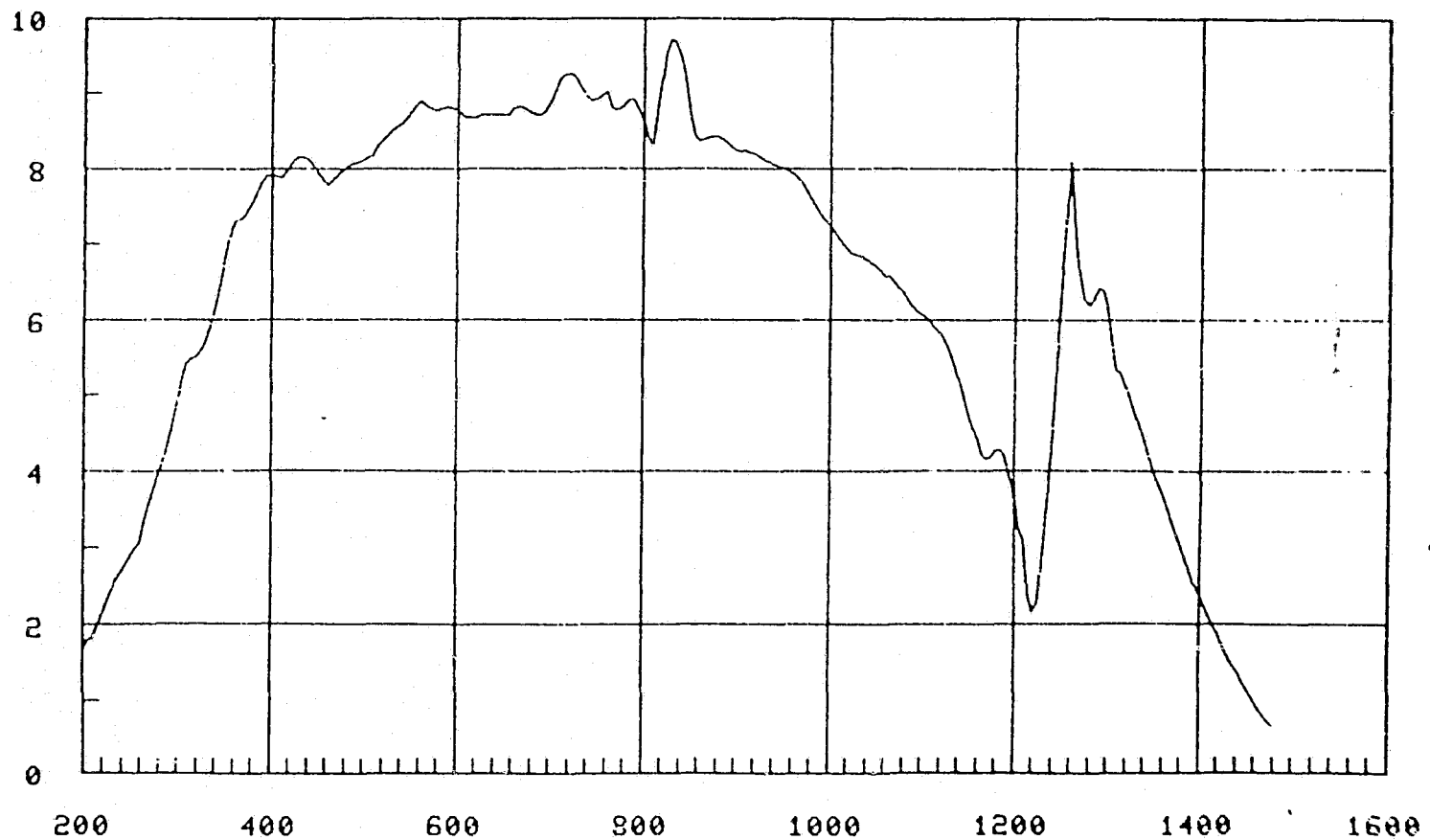
B-308

NS 43 S3

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

U07T9707A

HEATING RATE : BTU/FT² : SEC



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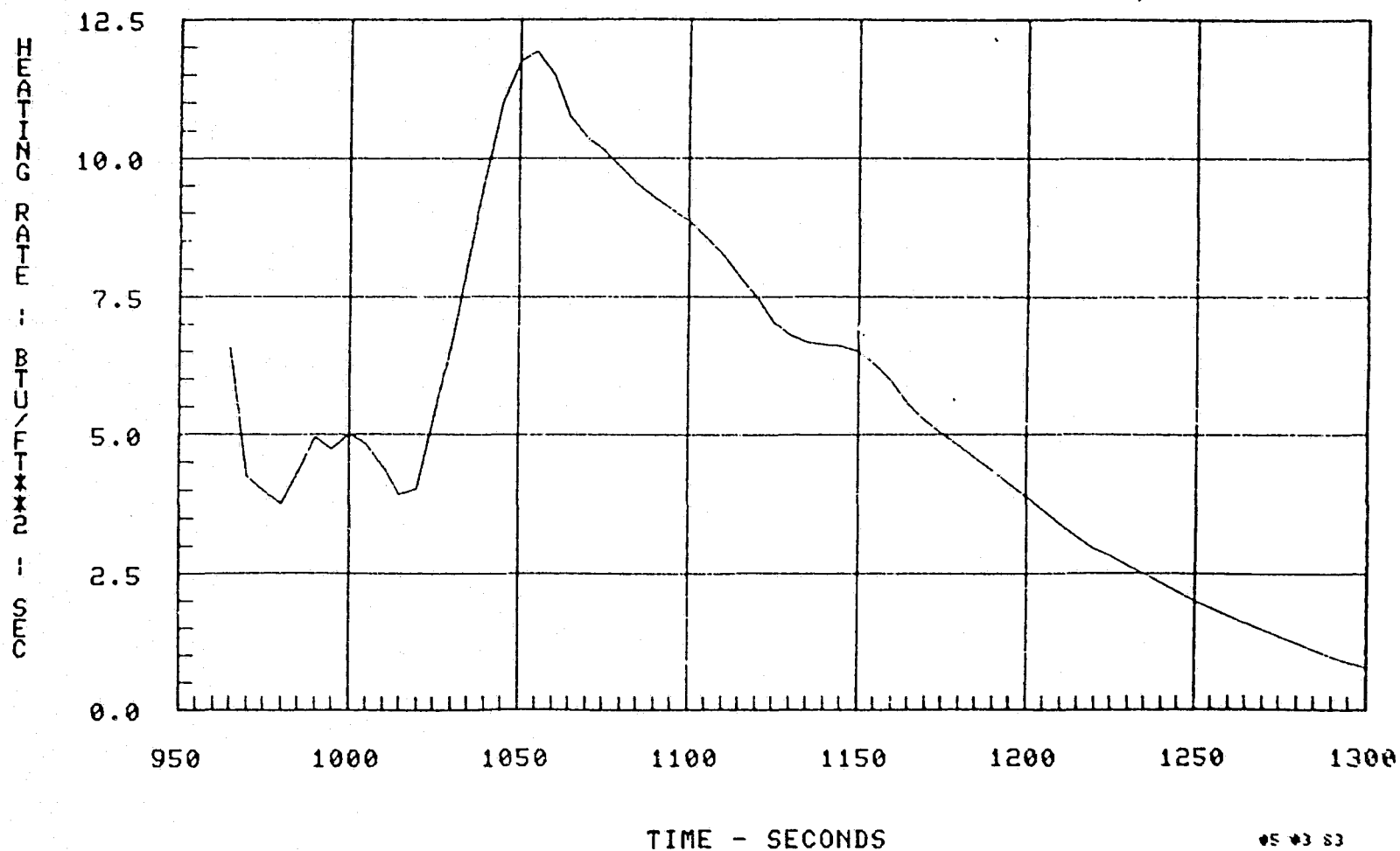
TIME - SECONDS

05 43 53

B-309

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

U07T9707A



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B-310

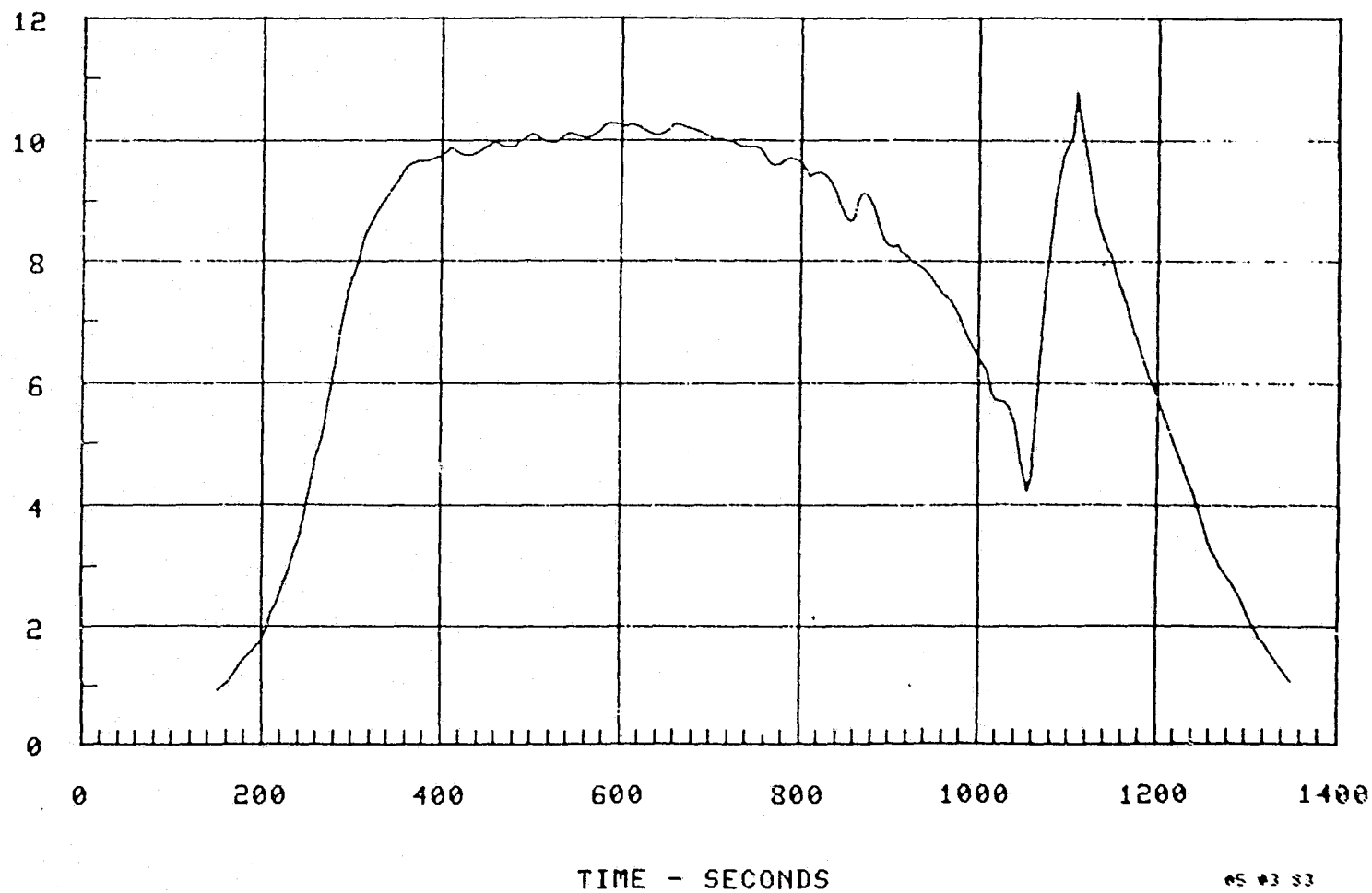
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STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.28

U07T9707A

HEATING RATE - BULLETINS - SMO

B-311

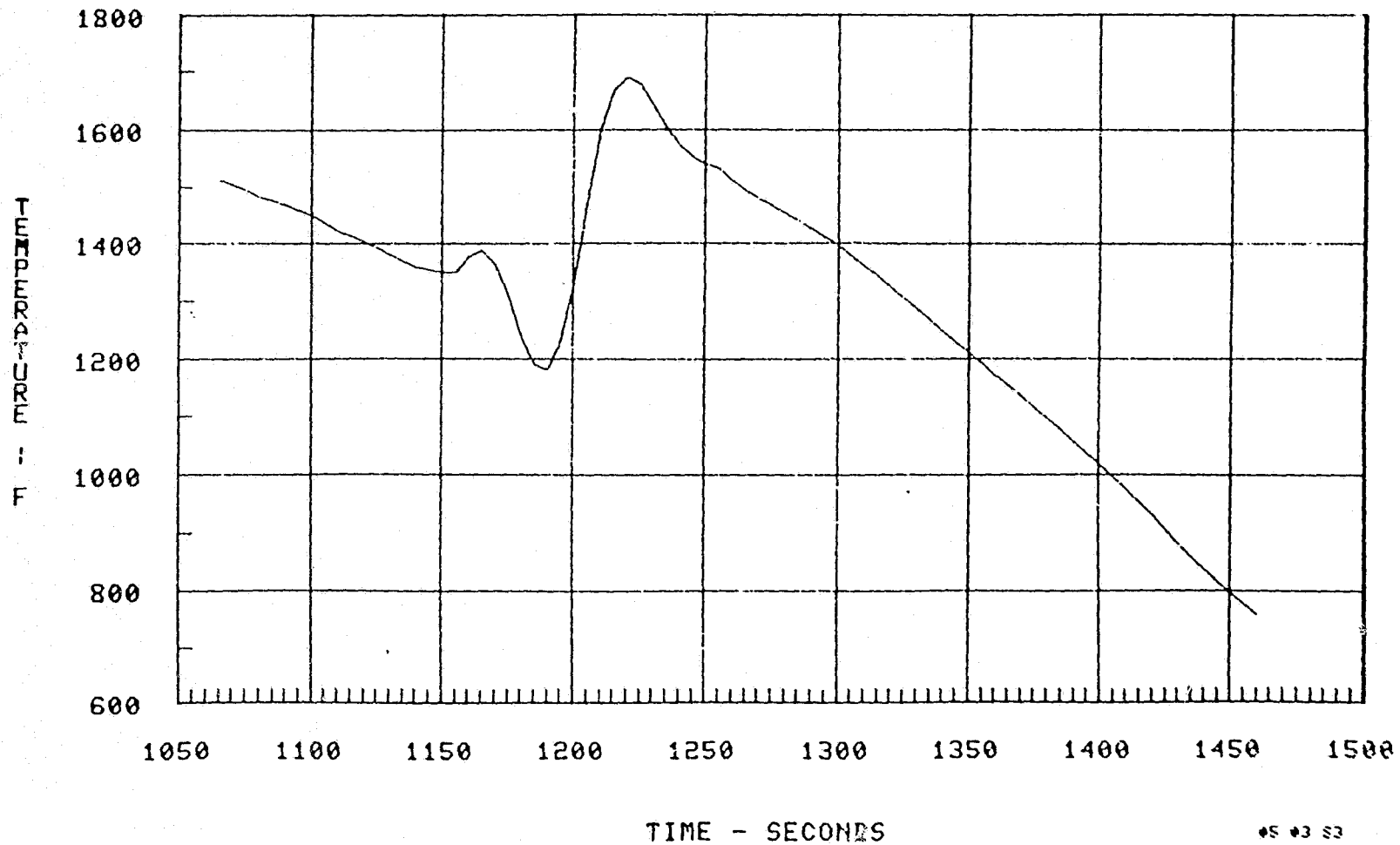


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AS 43 33

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.28

U07T9707A

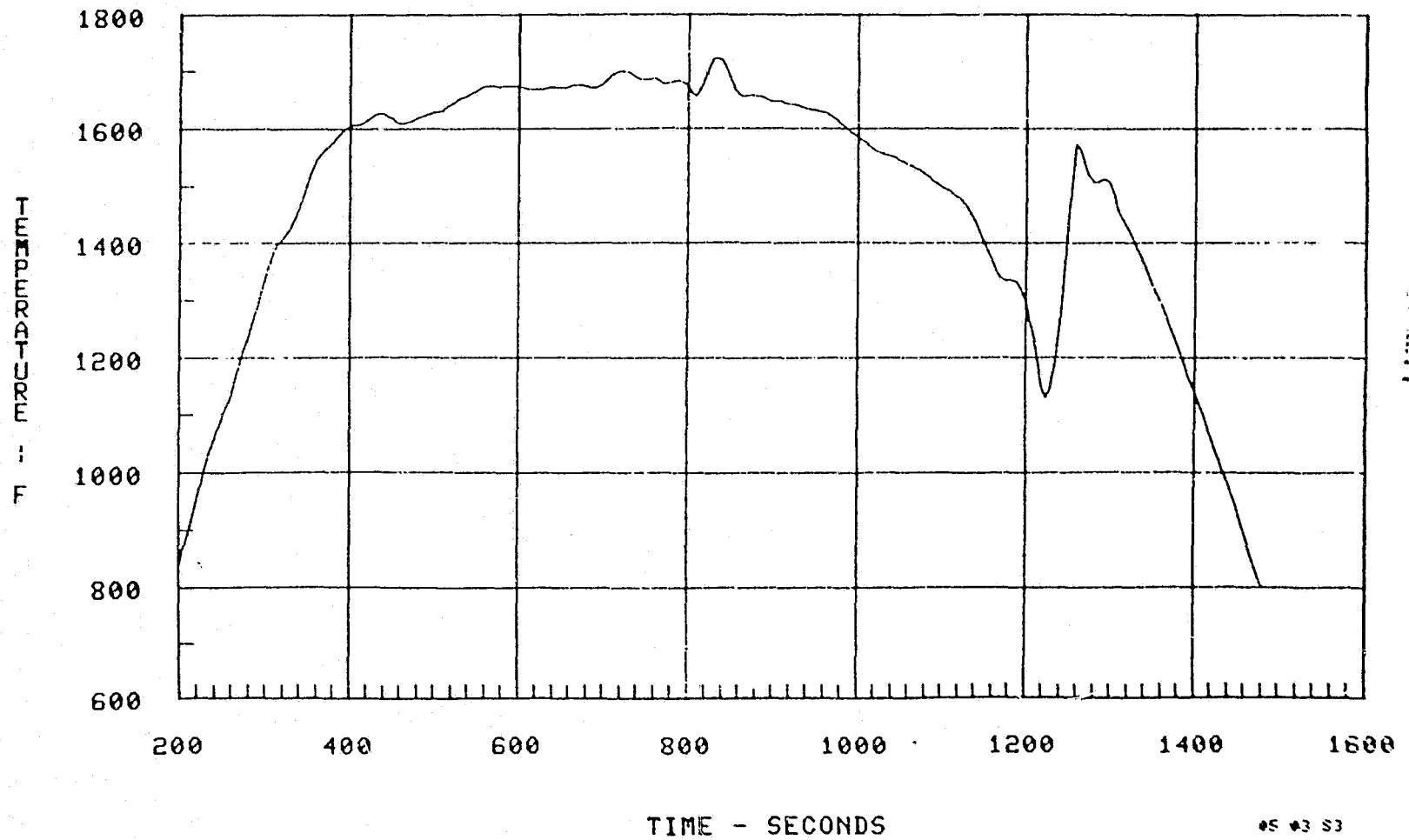


B-312

05 03 53

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

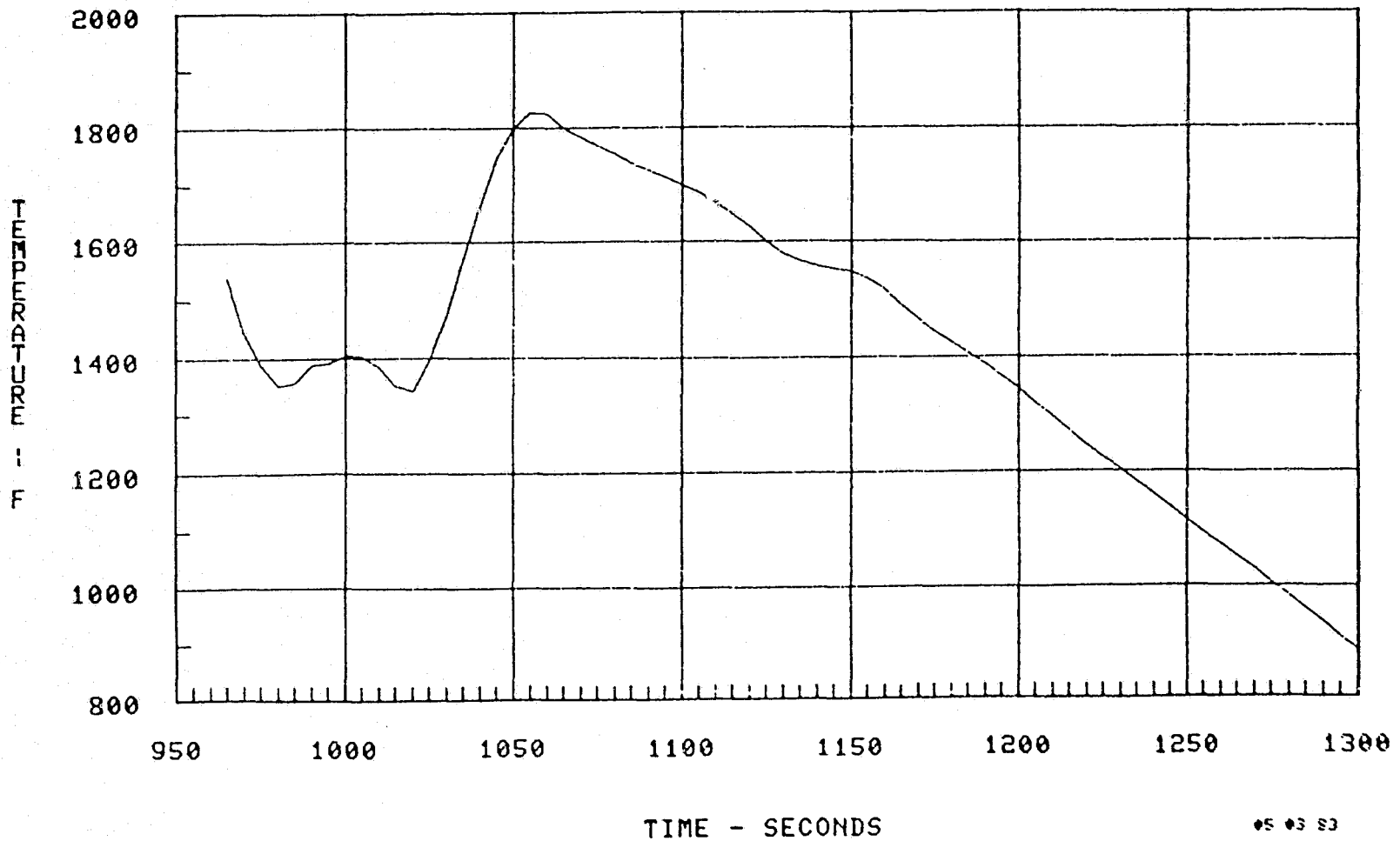
U67T9707A



B-313

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.28$

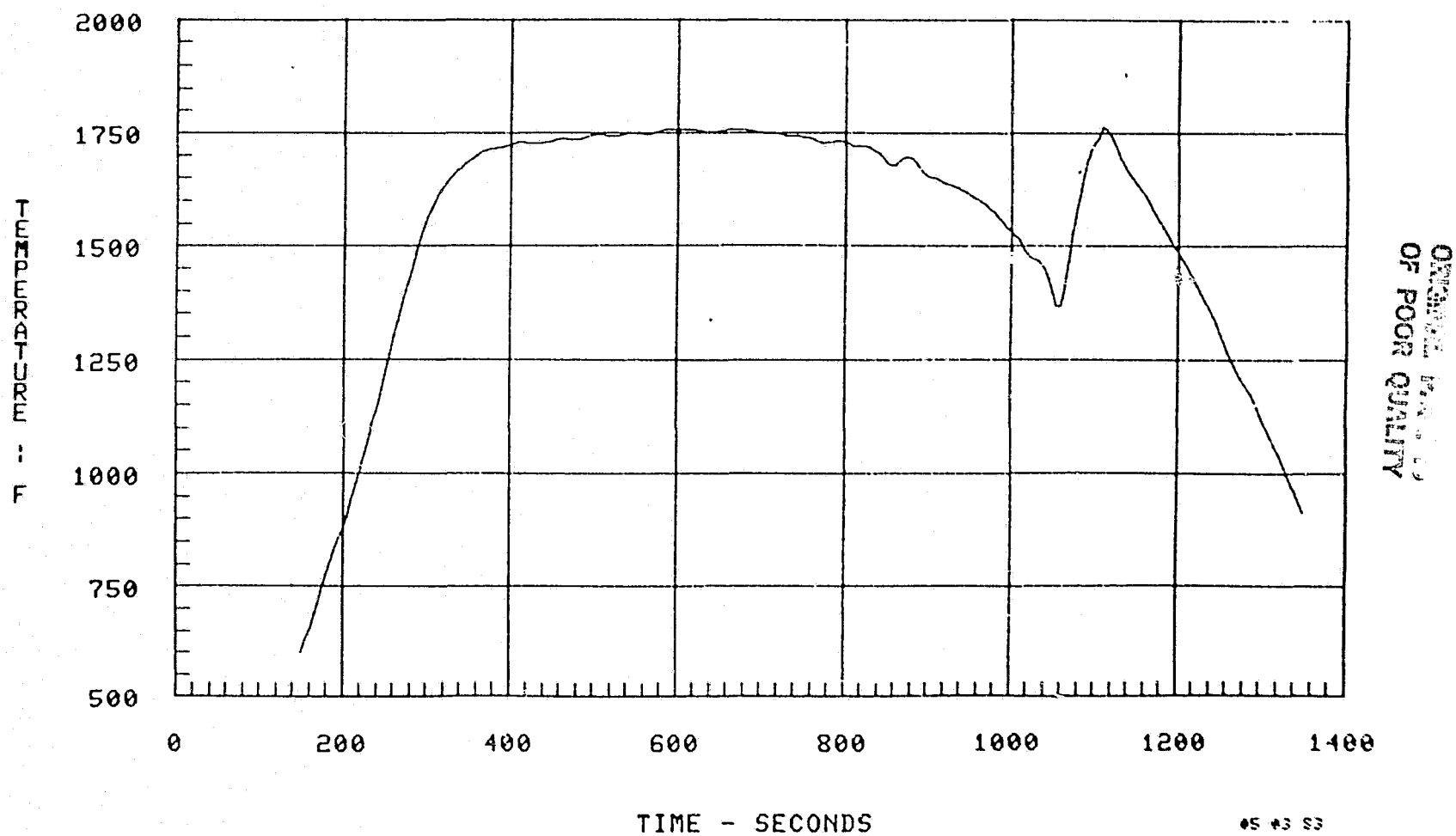
U07T9707A



B-314

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.28

U07T9707A



B-315

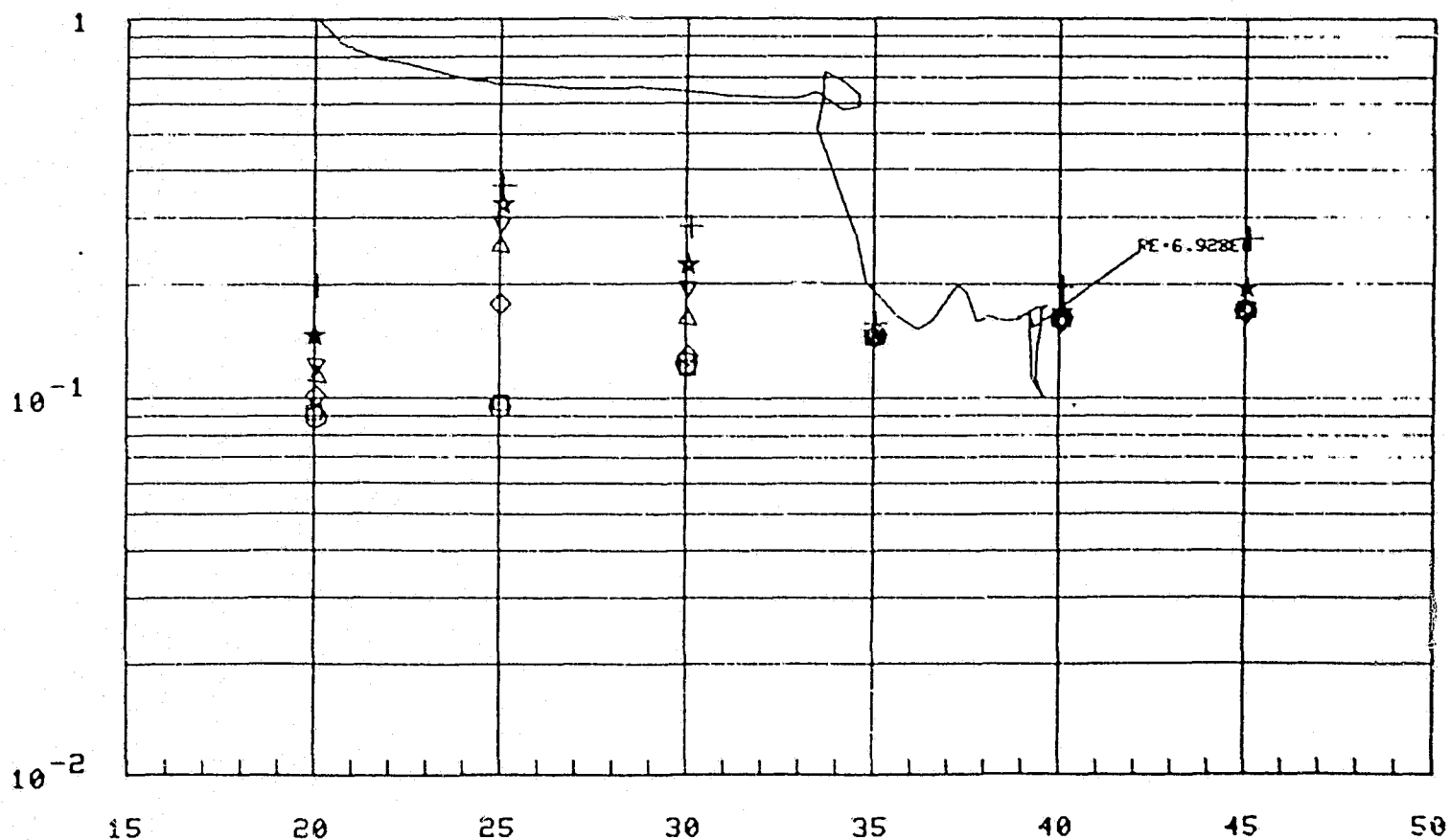
STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.35

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9708A/H-REF 1065-1460 SEC

LINE COUNT -- H-H-RULL



GENERAL PRINCIPLES
OF POOR QUALITY

ANGLE-OF-ATTACK - DEG

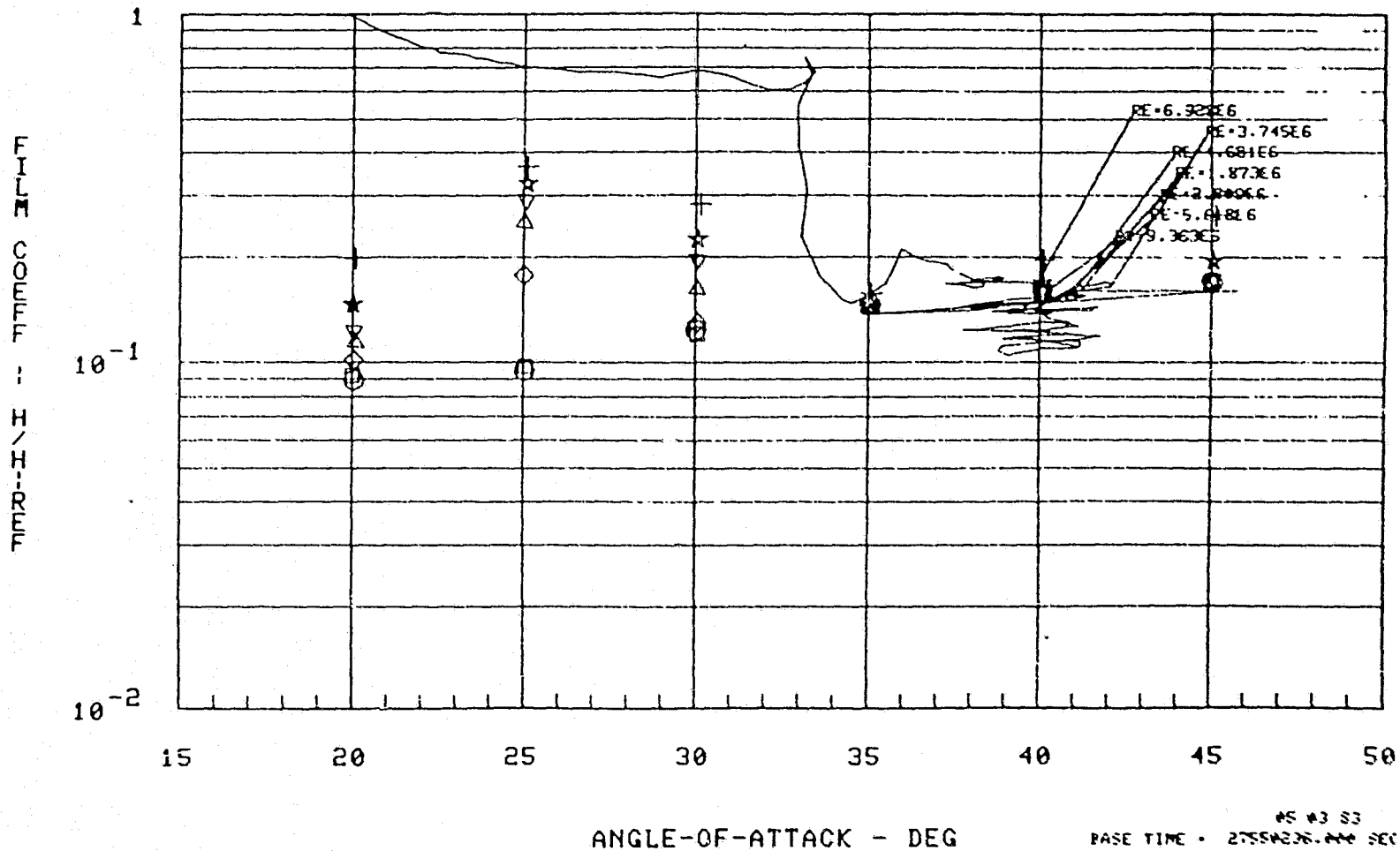
05 03 S3
BASE TIME * 09049744.000 SEC.

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.35

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9708A/H-REF 200-1480 SEC



B-317

ORIGINAL PLOT
OF POOR QUALITY

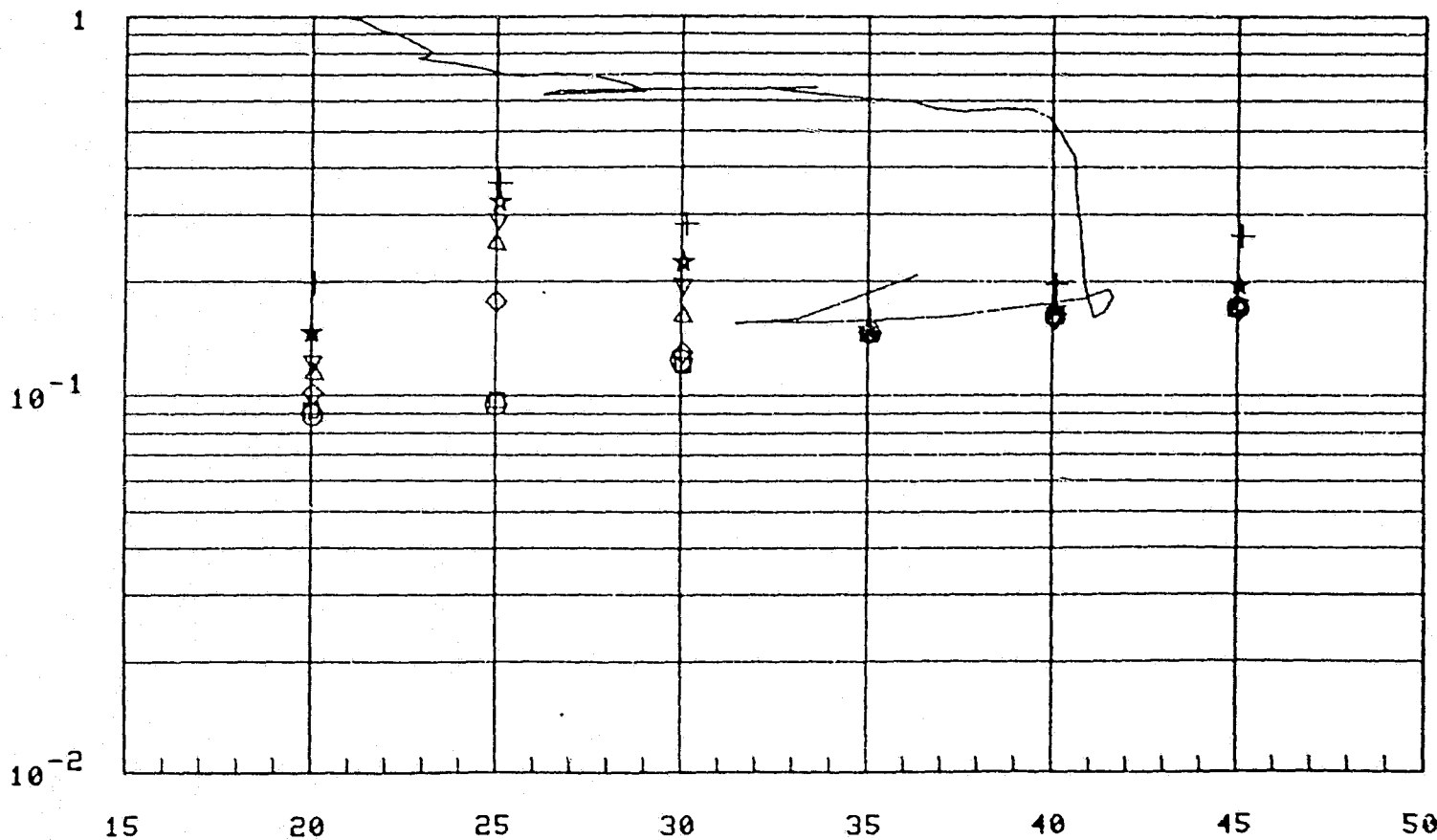
STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.35

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OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

U07T9708A/H-REF 965-1300 SEC

FLIM COWELL - H-H-CELL



ANGLE-OF-ATTACK - DEG

05 03 83
BASE TIME • 10040423.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

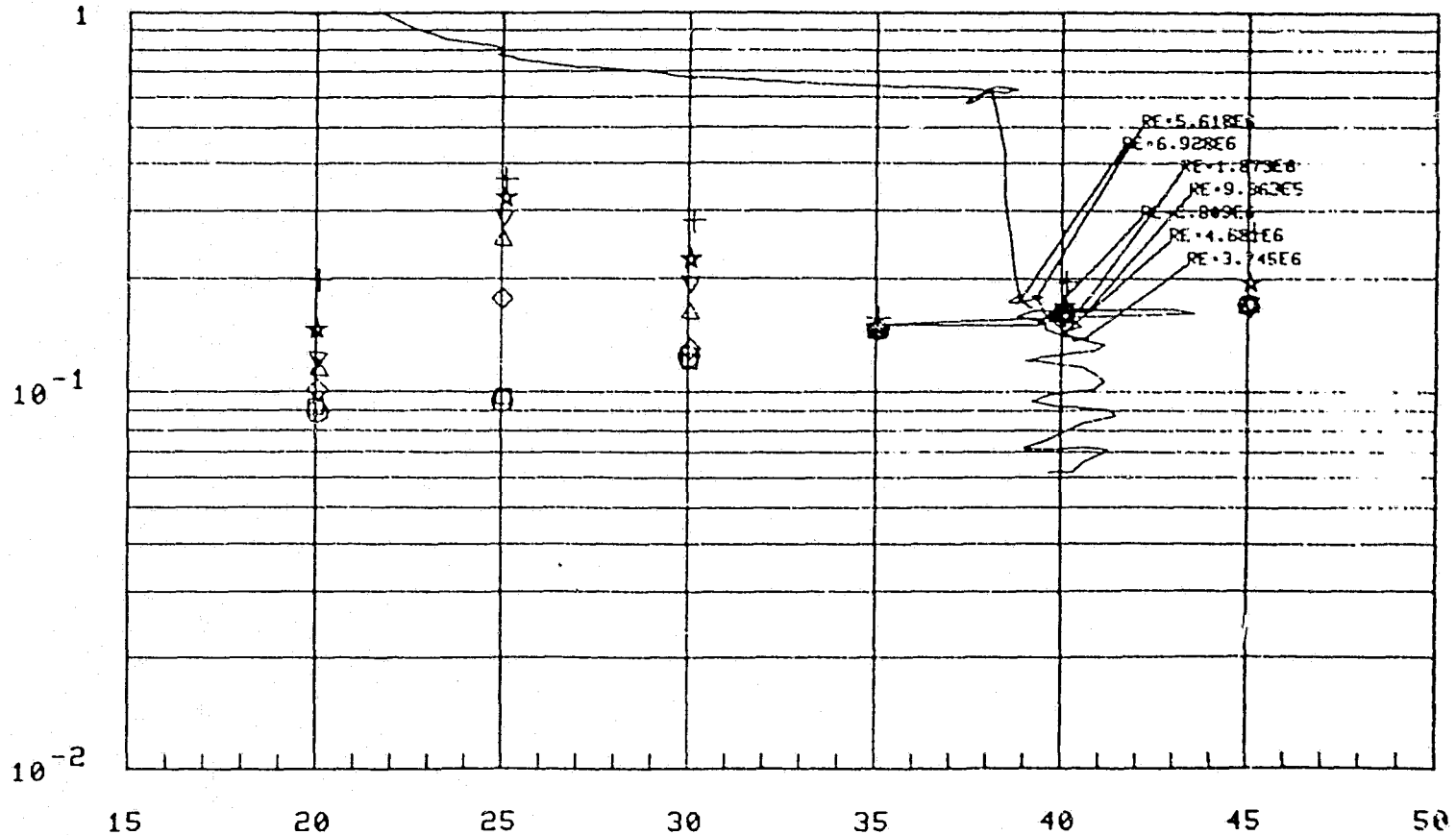
STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.35

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OH39 0.0175 SCALE RE = 0.5 E06
 OH39 0.0175 SCALE RE = 1.0 E06
 OH39 0.0175 SCALE RE = 1.5 E06
 OH39 0.0175 SCALE RE = 2.0 E06
 OH39 0.0175 SCALE RE = 2.5 E06
 OH39 0.0175 SCALE RE = 3.0 E06
 OH39 0.0175 SCALE RE = 3.7 E06

U07T9708A/H-REF 150-1350 SEC

FLIM COUPLER - H/H-REF



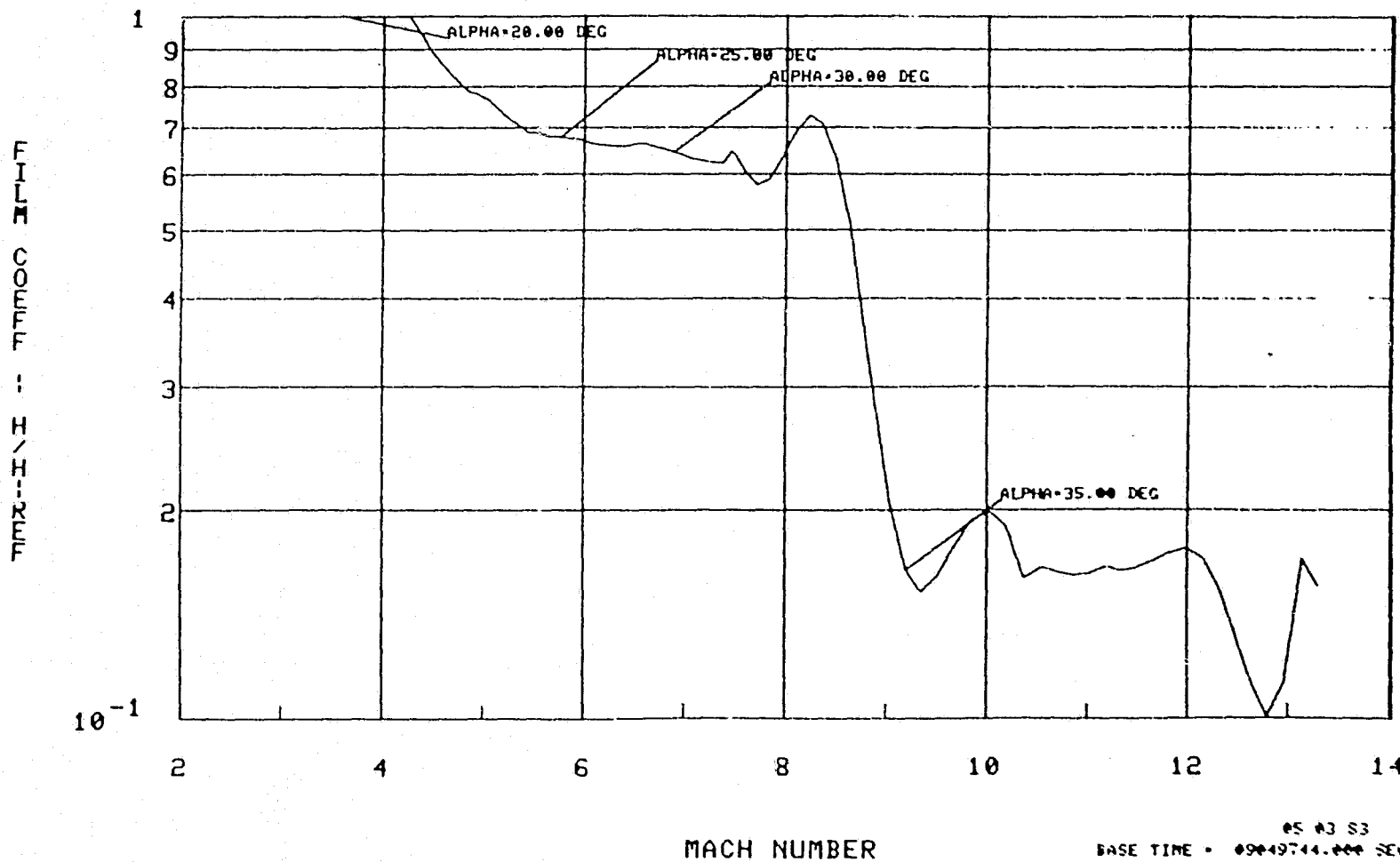
ANGLE-OF-ATTACK - DEG

BASE TIME - 27095591.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.35

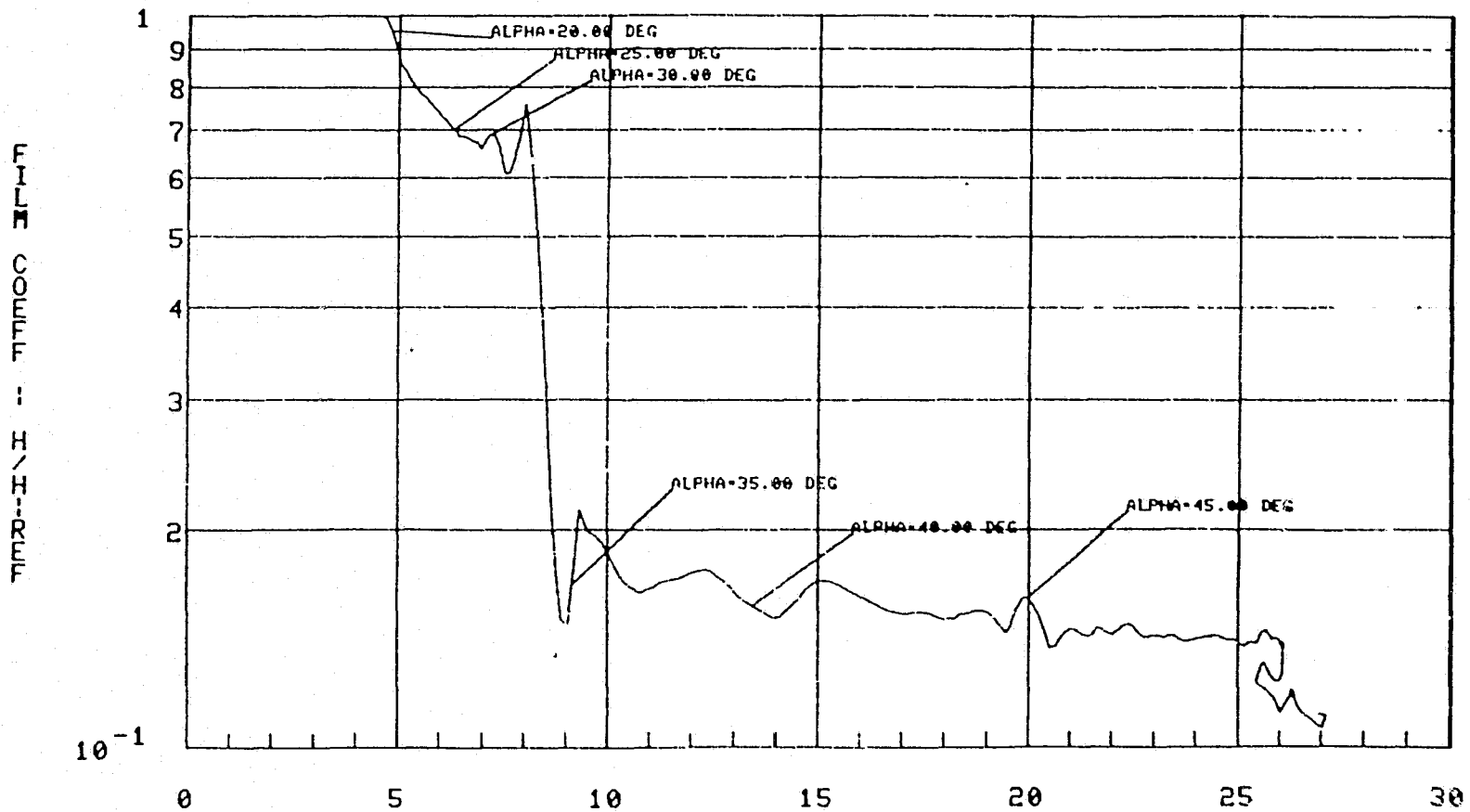
U07T9708A/H-REF 1065-1460 SEC



ORIGINAL PAGE IS
OF POOR QUALITY

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

U07T9708A/H-REF 200-1480 SEC



B-327

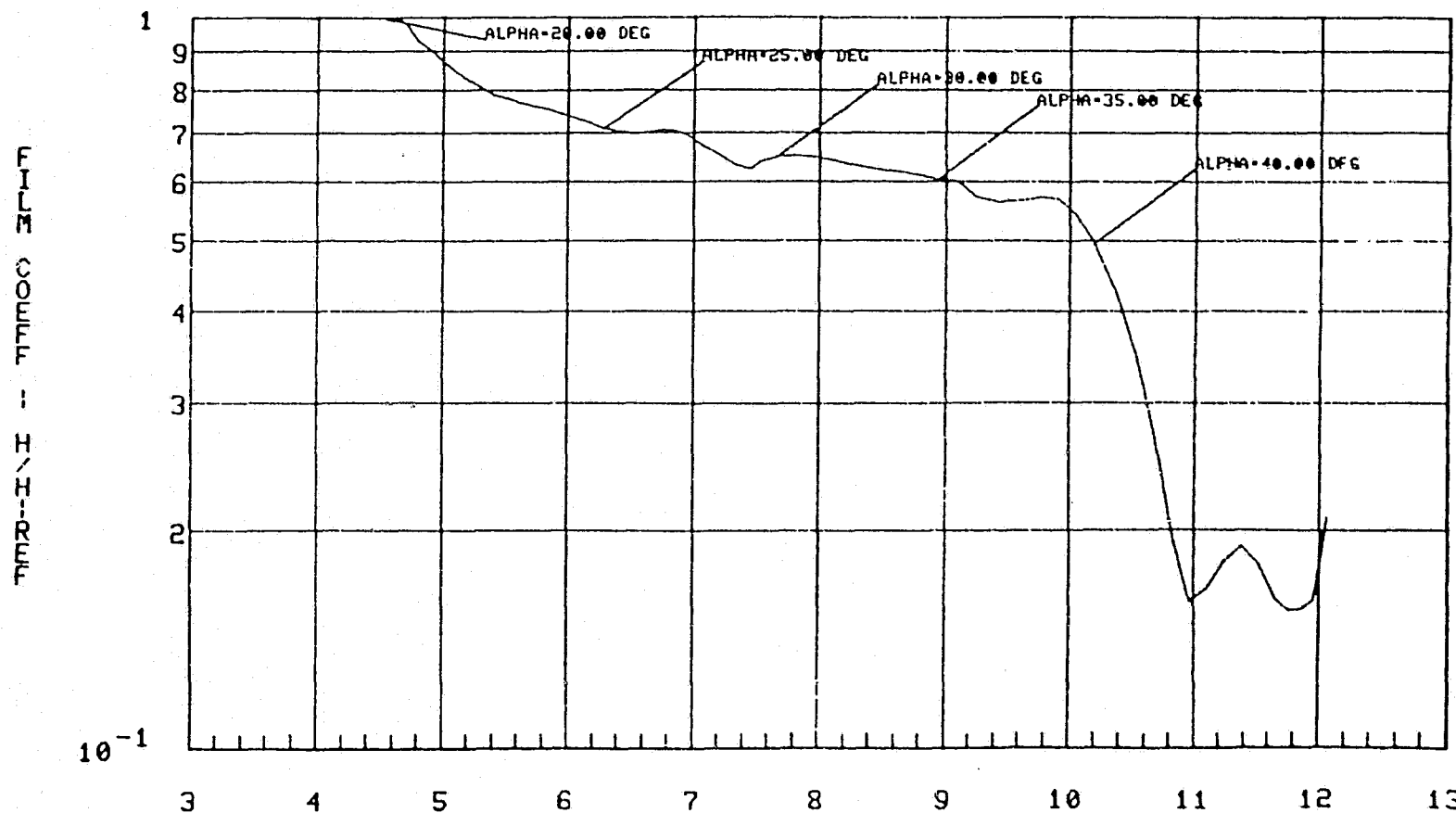
ORIGINAL PAGE IS
OF POOR QUALITY

MACH NUMBER

05 03 53
BASE TIME - 2755020.000 SEC.

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

U07T9708A/H-REF 965-1300 SEC



B-322

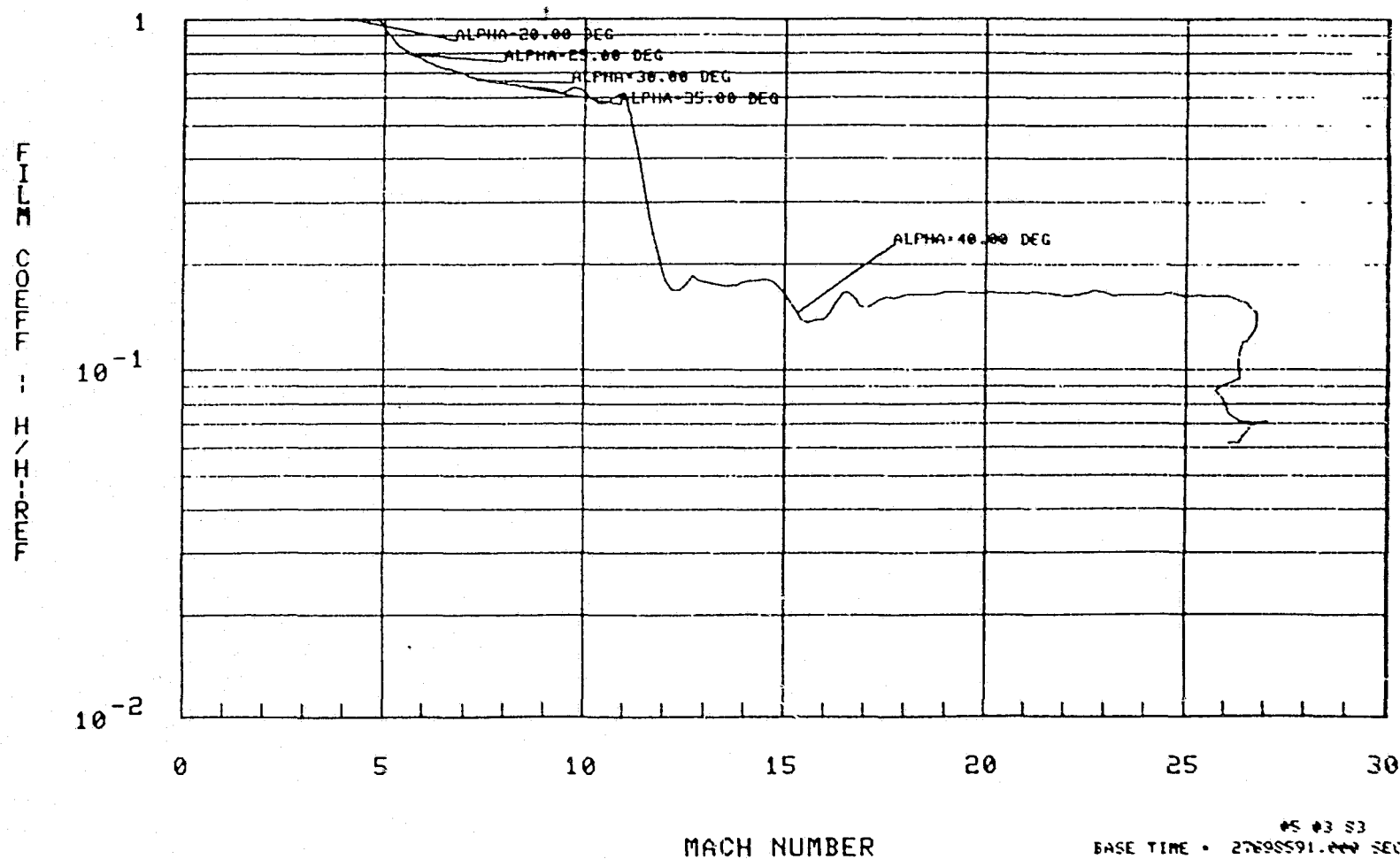
ORIGINAL PAGE IS
OF POOR QUALITY

MACH NUMBER

05 03 83
BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

U07T9708A/H-REF 150-1350 SEC



ORIGINAL PAGE IS
OF POOR QUALITY

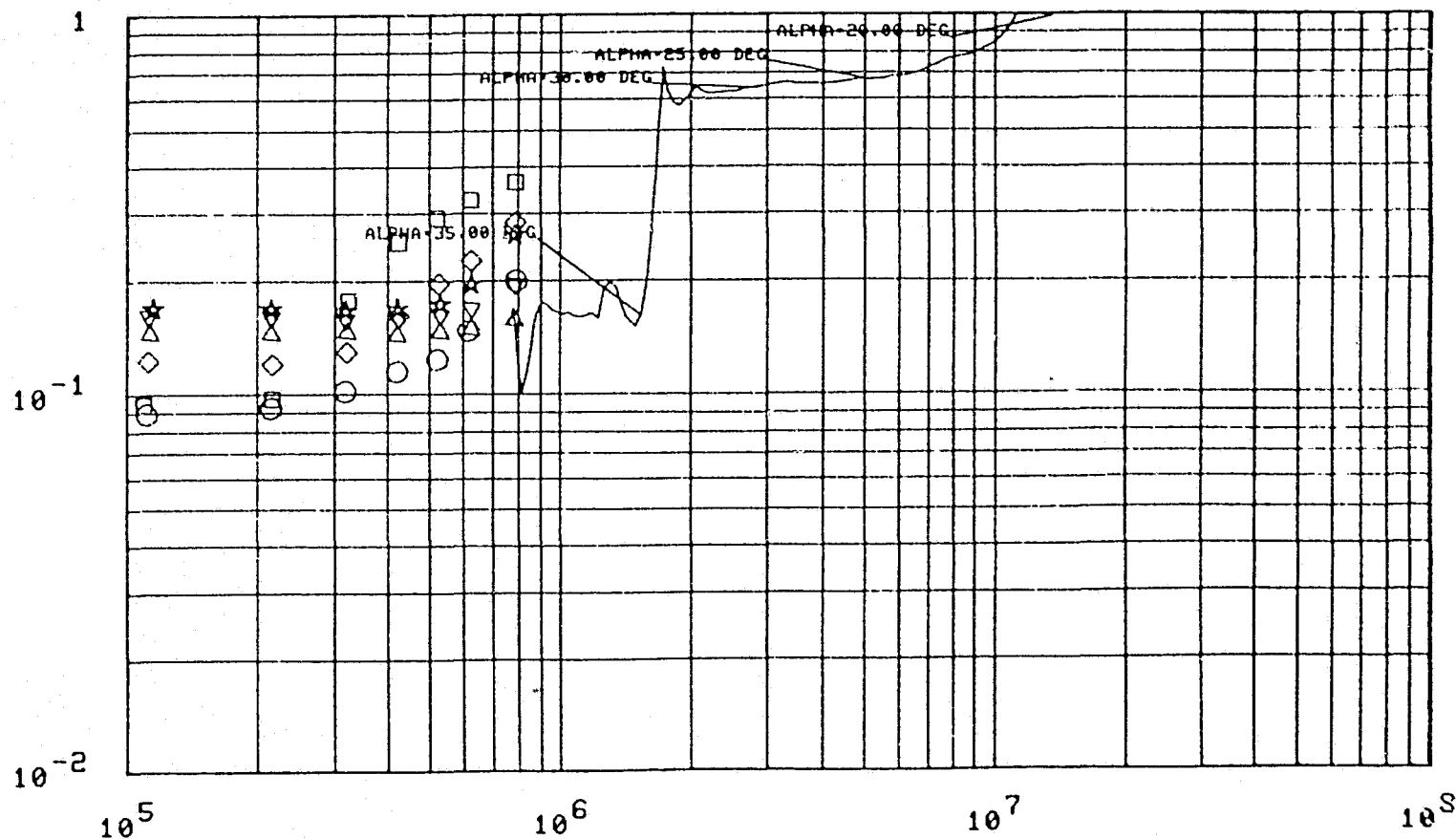
STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.35

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U87T9708A/H-REF 1065-1460 SEC

FILE CODE: H-H-KILL



REYNOLDS NUMBER (NS)

05 43 S3
BASE TIME = 09049744.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

B-324

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

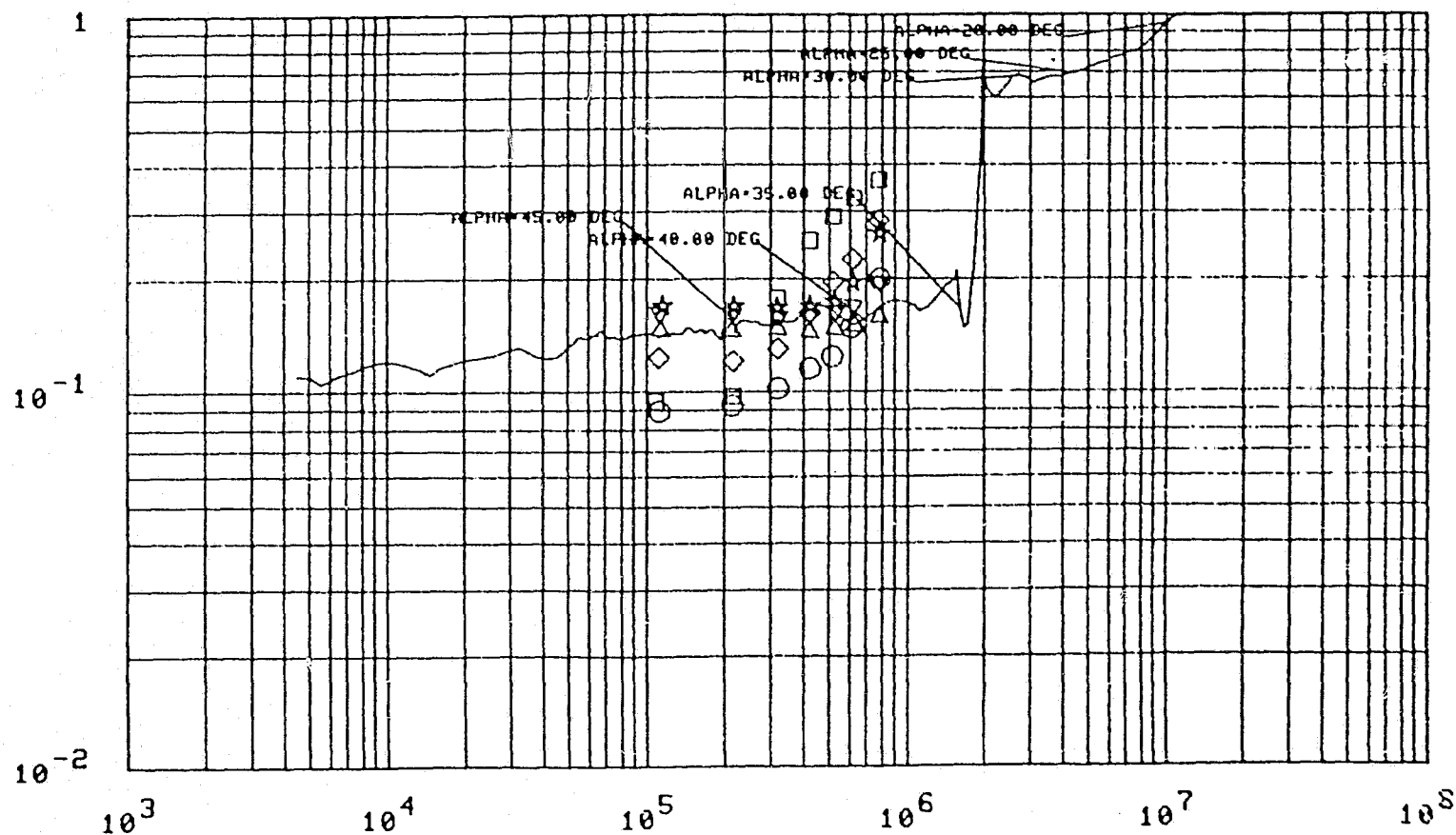
U07T9708A/H-REF 200-1450 SEC

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

FILE COWLE - H/H-REF.

B-325



REYNOLDS NUMBER (NS)

BASE TIME = 275502.00 SEC

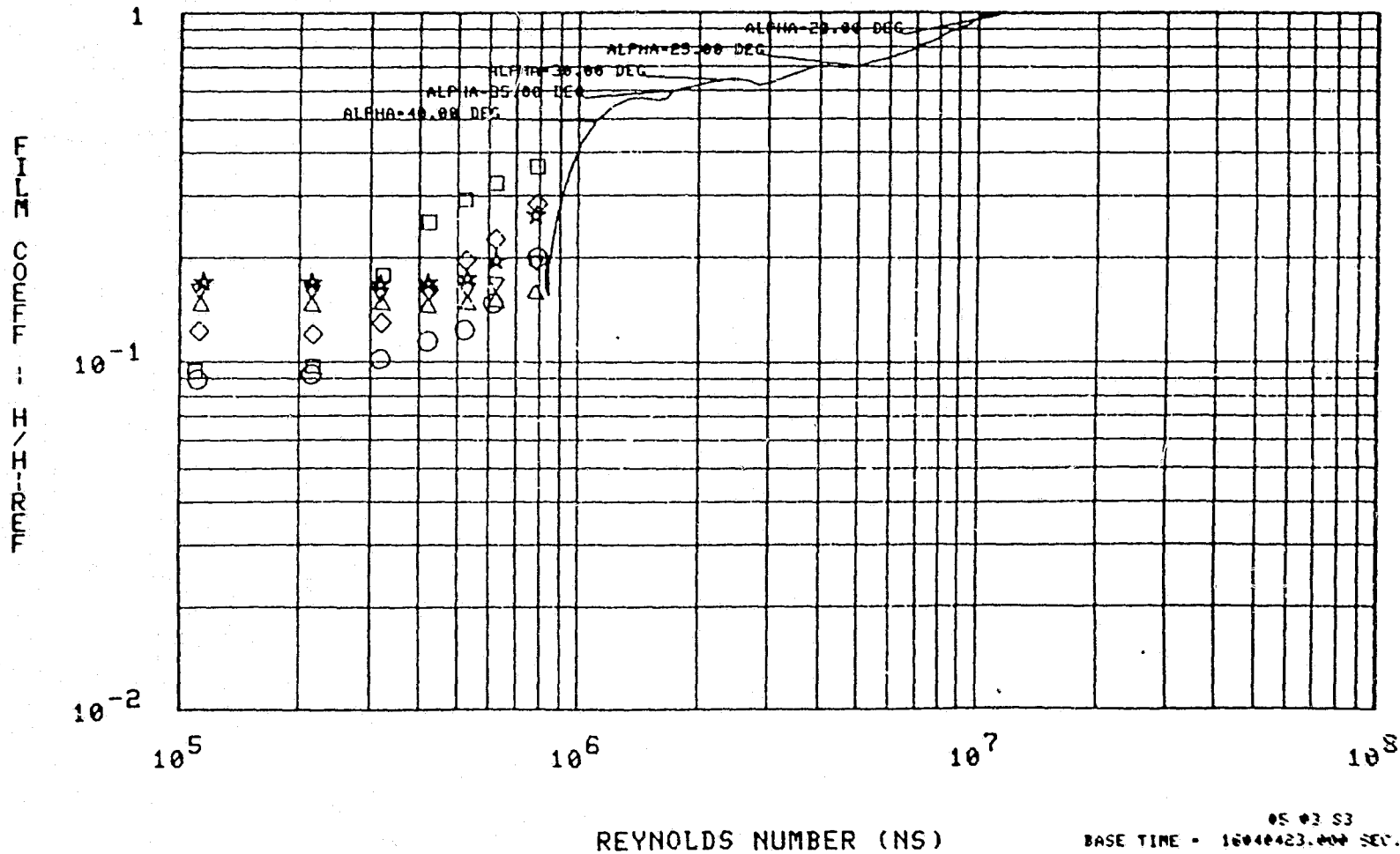
ORIGINAL PAGE IS
OF POOR QUALITY

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.35

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9708A/H-REF 965-1300 SEC



ORIGINAL PAGE IS
OF POOR QUALITY

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

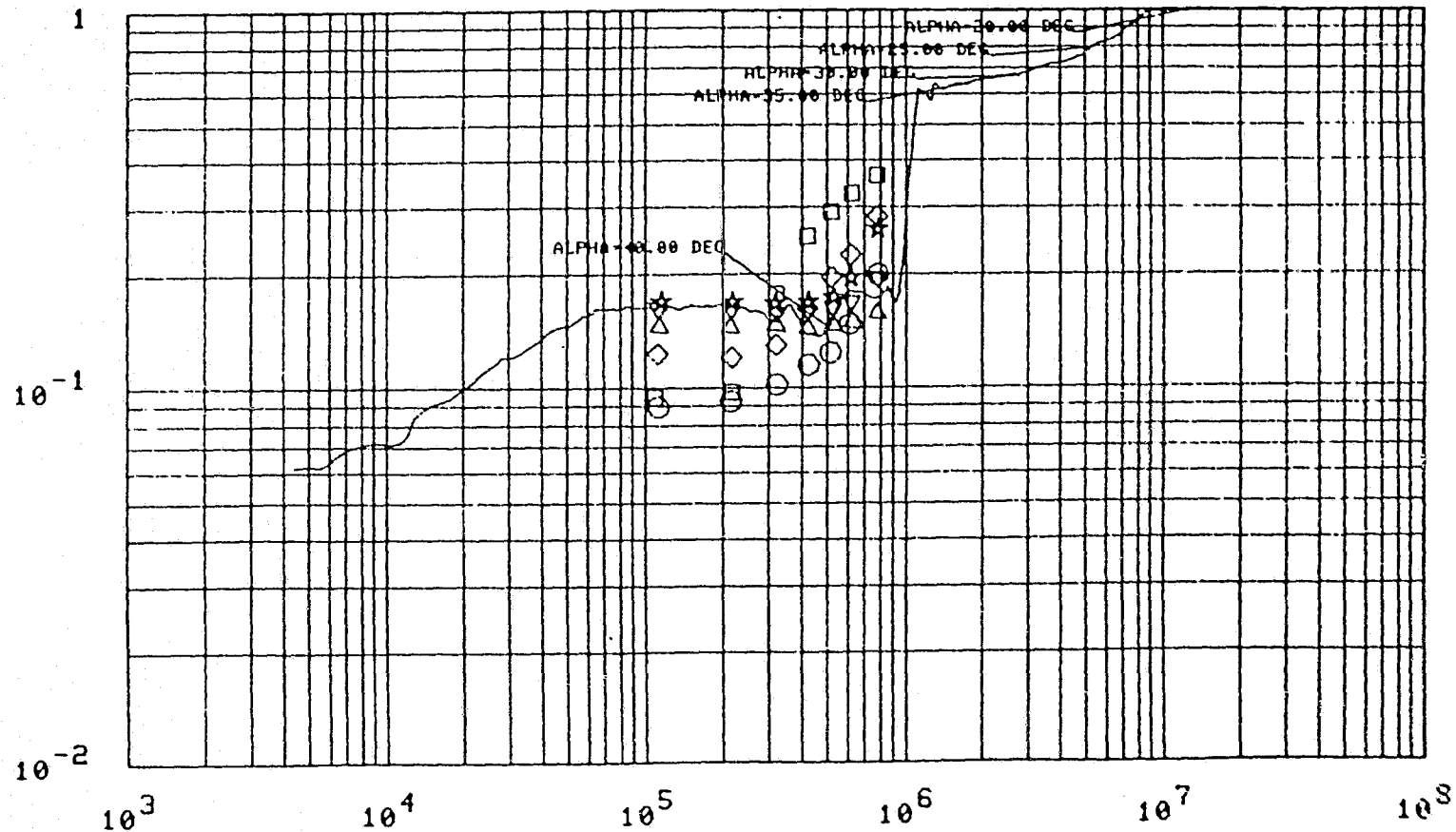
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OH39 ALPHA * 20 DEGREES
OH39 ALPHA * 25 DEGREES
OH39 ALPHA * 30 DEGREES
OH39 ALPHA * 35 DEGREES
OH39 ALPHA * 40 DEGREES
OH39 ALPHA * 45 DEGREES

U07T9708A/H-REF 150-1350 SEC

FILE COWELL - H/H-RULL

B-327



ORIGINAL PAGE IS
OF POOR QUALITY

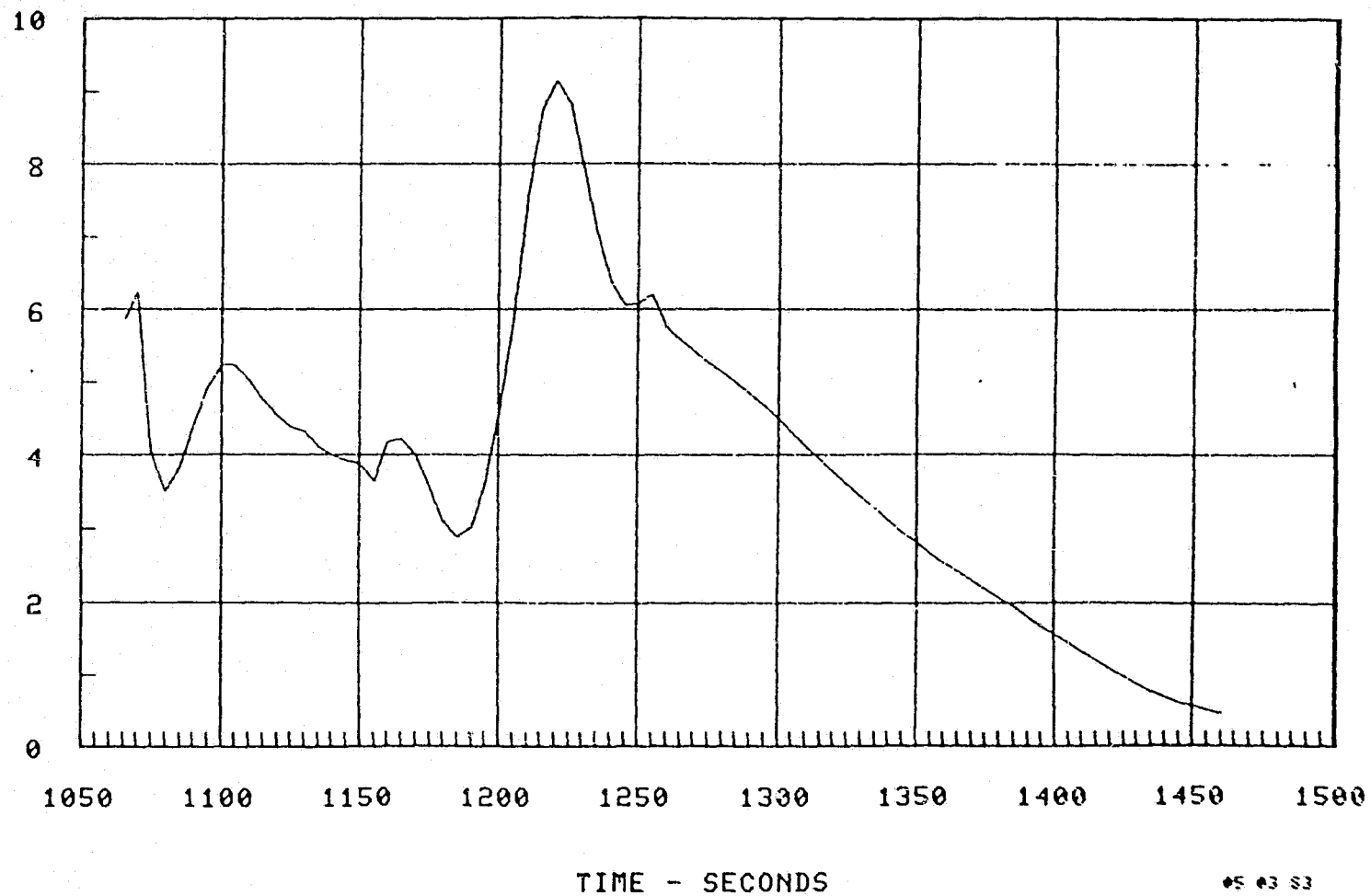
REYNOLDS NUMBER (NS)

#5 #3 S3
BASE TIME * 27695591.444 SEC.

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

U07T9708A

HEATING RATE - BUILDING - SMC



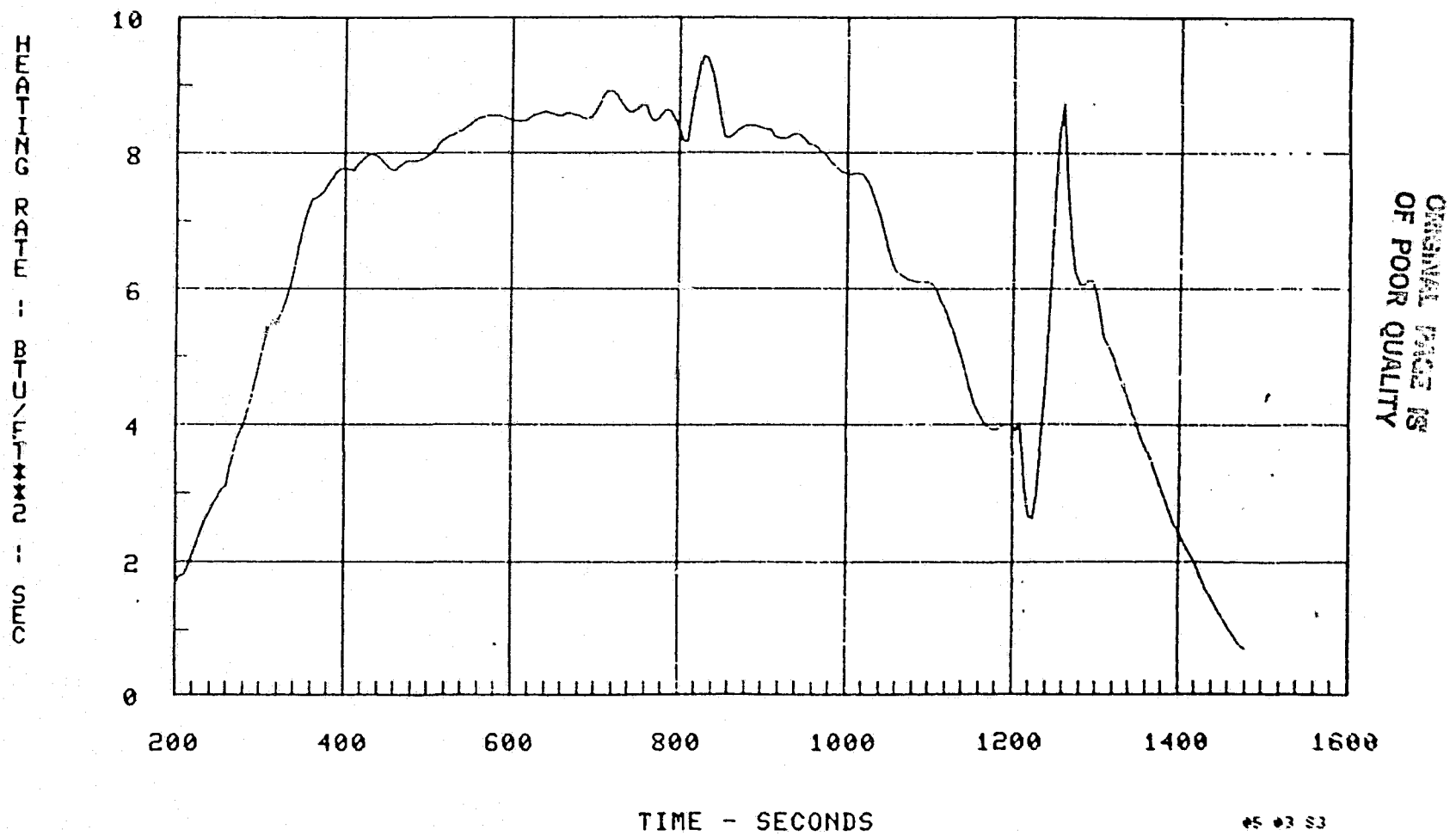
ORIGINAL PAGE IS
OF POOR QUALITY

05 43 53

B-328

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

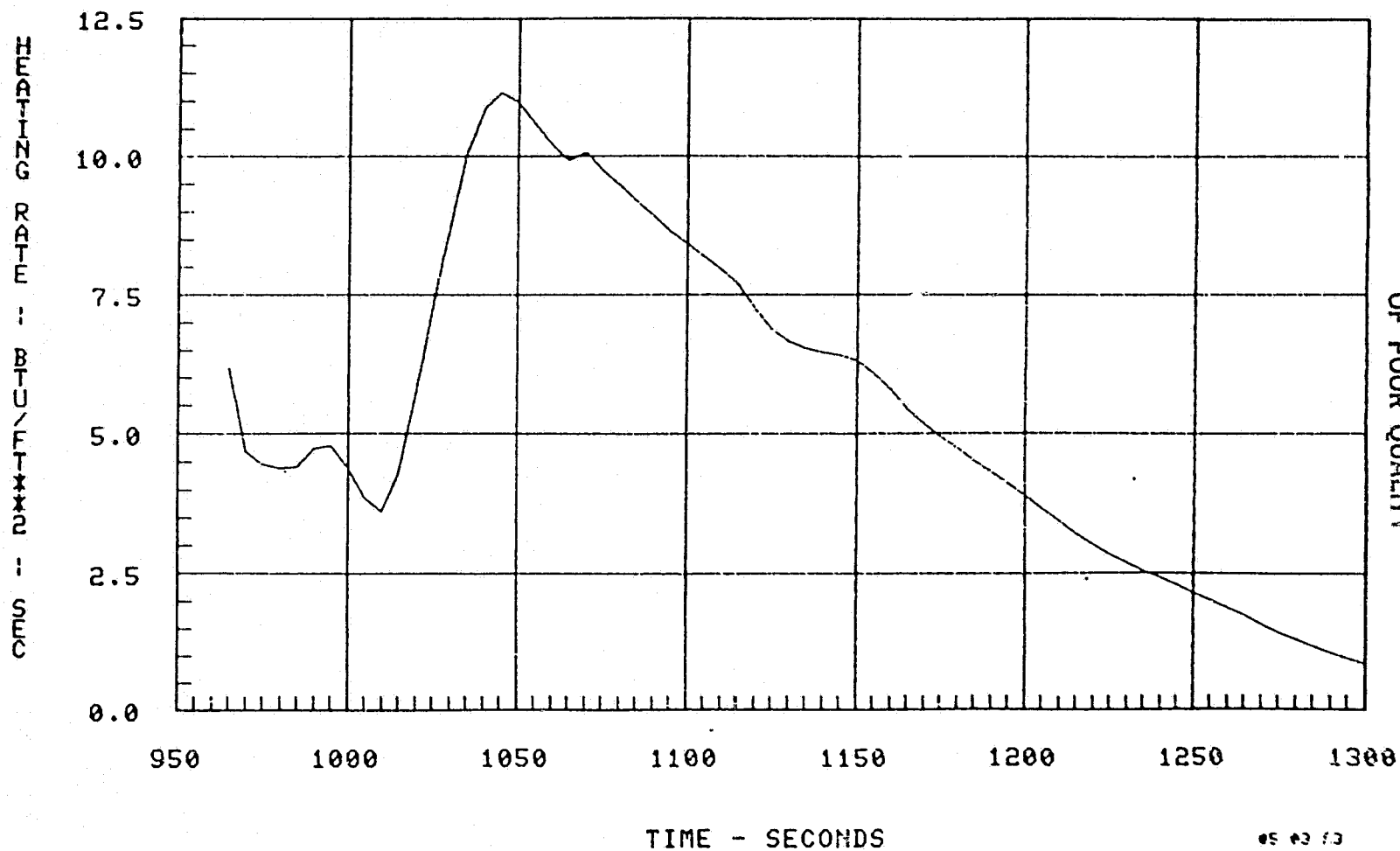
U07T9708A



B-329

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.35

U37T9708A



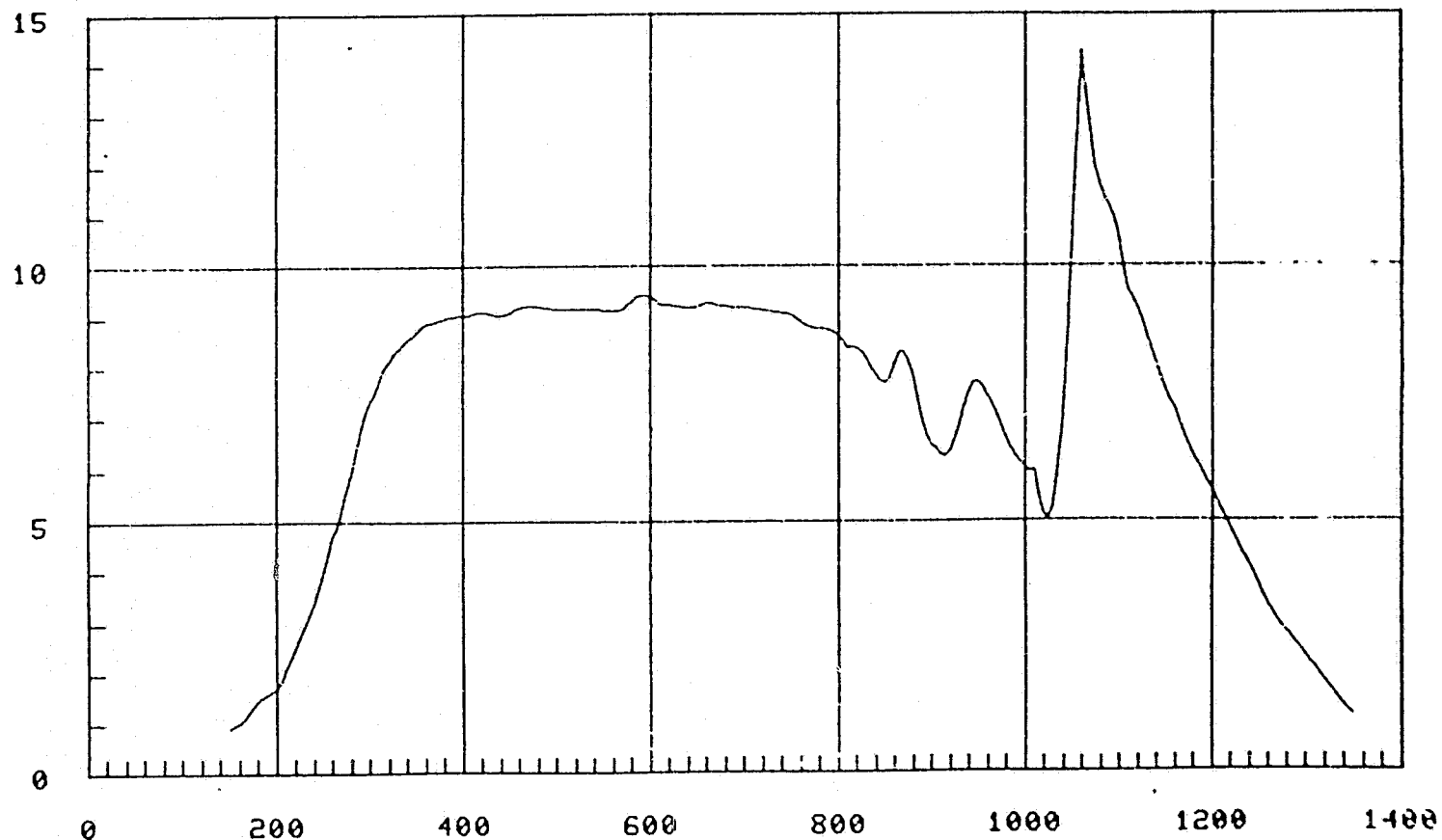
B-330

05 03 73

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

007T9708A

HEATING RATE :: BULB TEMPERATURE :: SEC



TIME - SECONDS

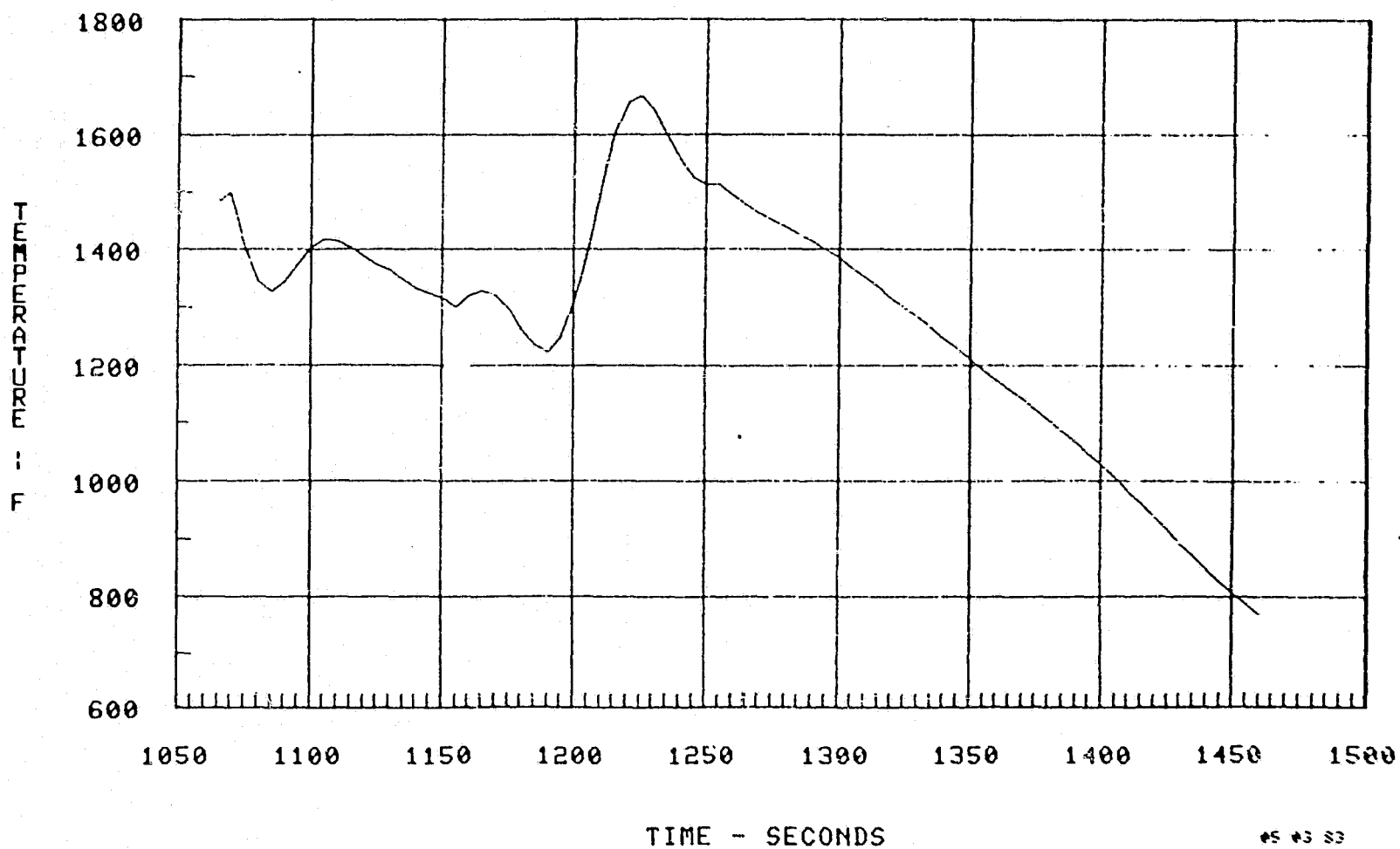
45 43 53

ORIGINAL PAGE IS
OF POOR QUALITY

B-331

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

U07T9702A



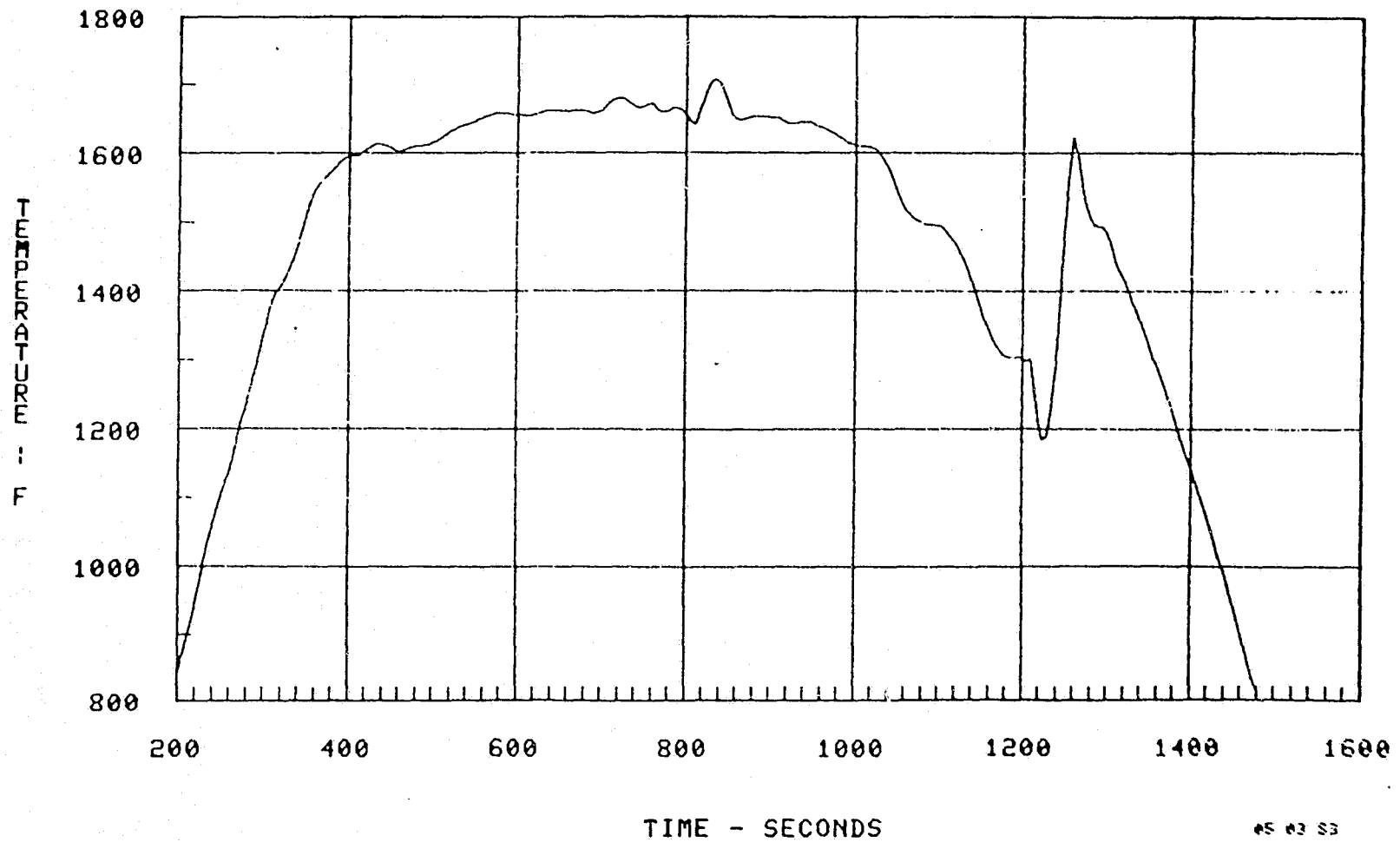
B-332

ORIGINAL PAGE IS
OF POOR QUALITY

#5 #3 33

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.35$

U07T9708A

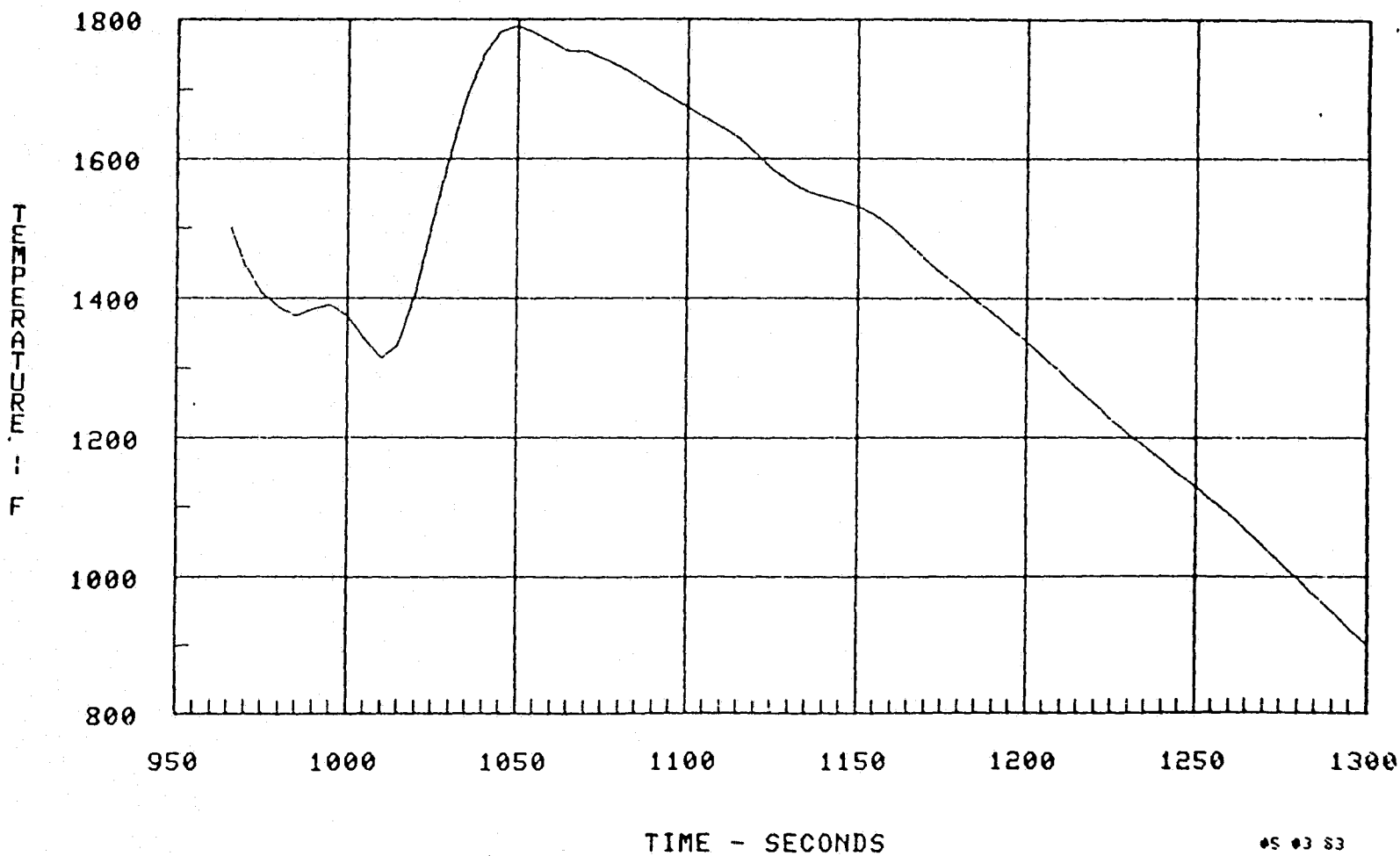


B-333

OF POOR QUALITY

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.35

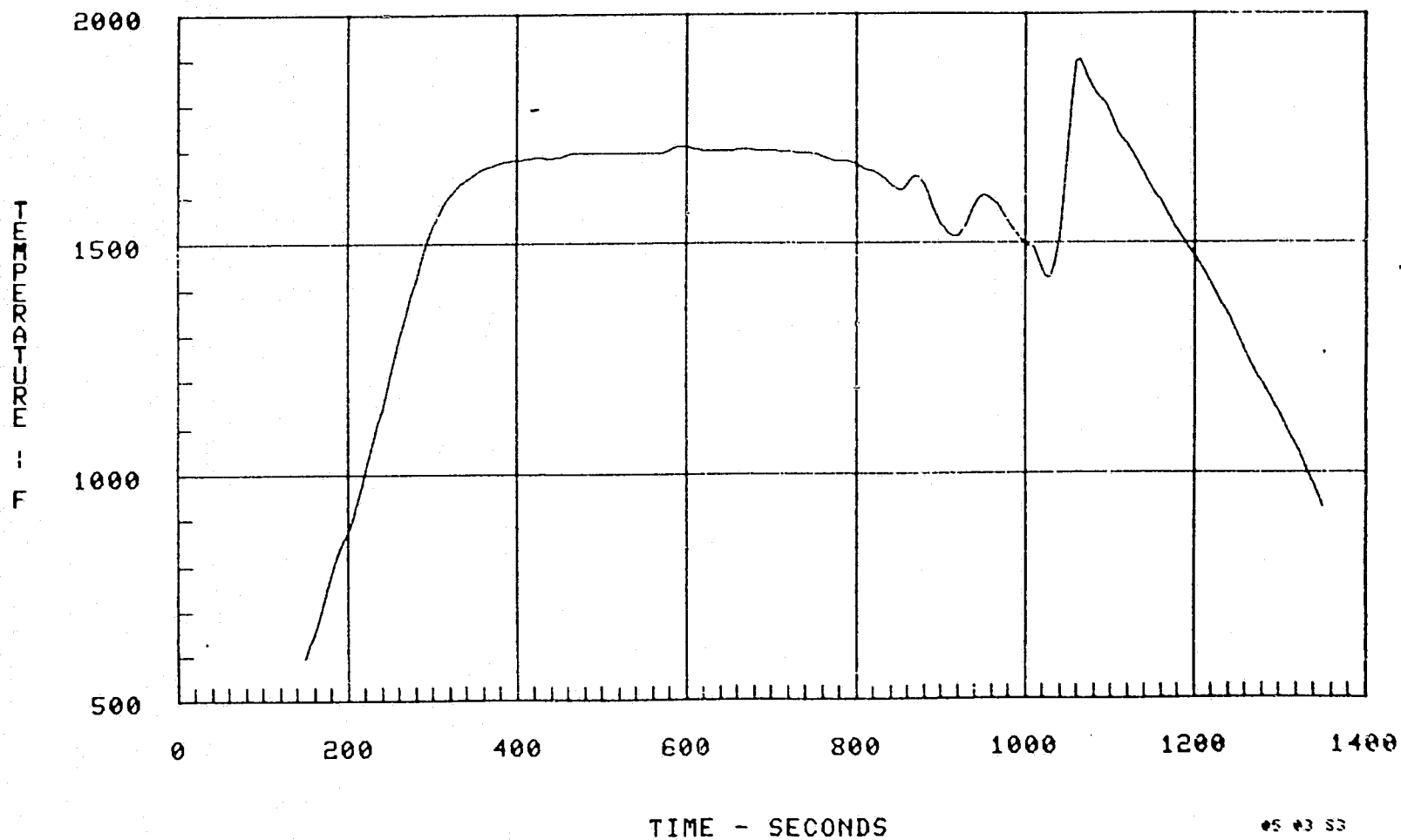
U07T9708A



B-334

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.35

U07T9708A



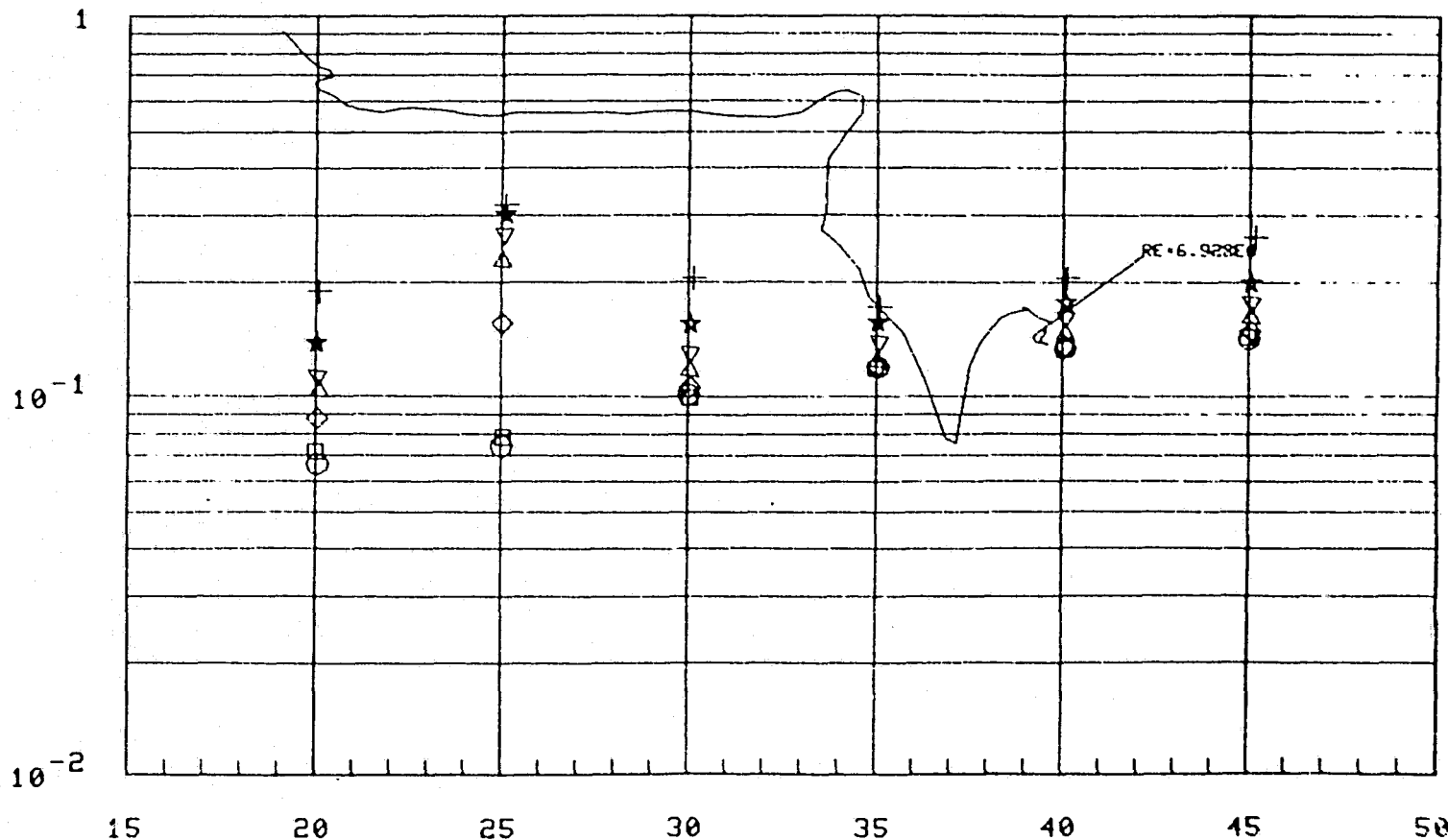
STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.52

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9710A/H-REF 1065-1460 SEC

LINE CODEL - I/I-000



ANGLE-OF-ATTACK - DEG

#5 #3 S3
BASE TIME = 0949744.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.52

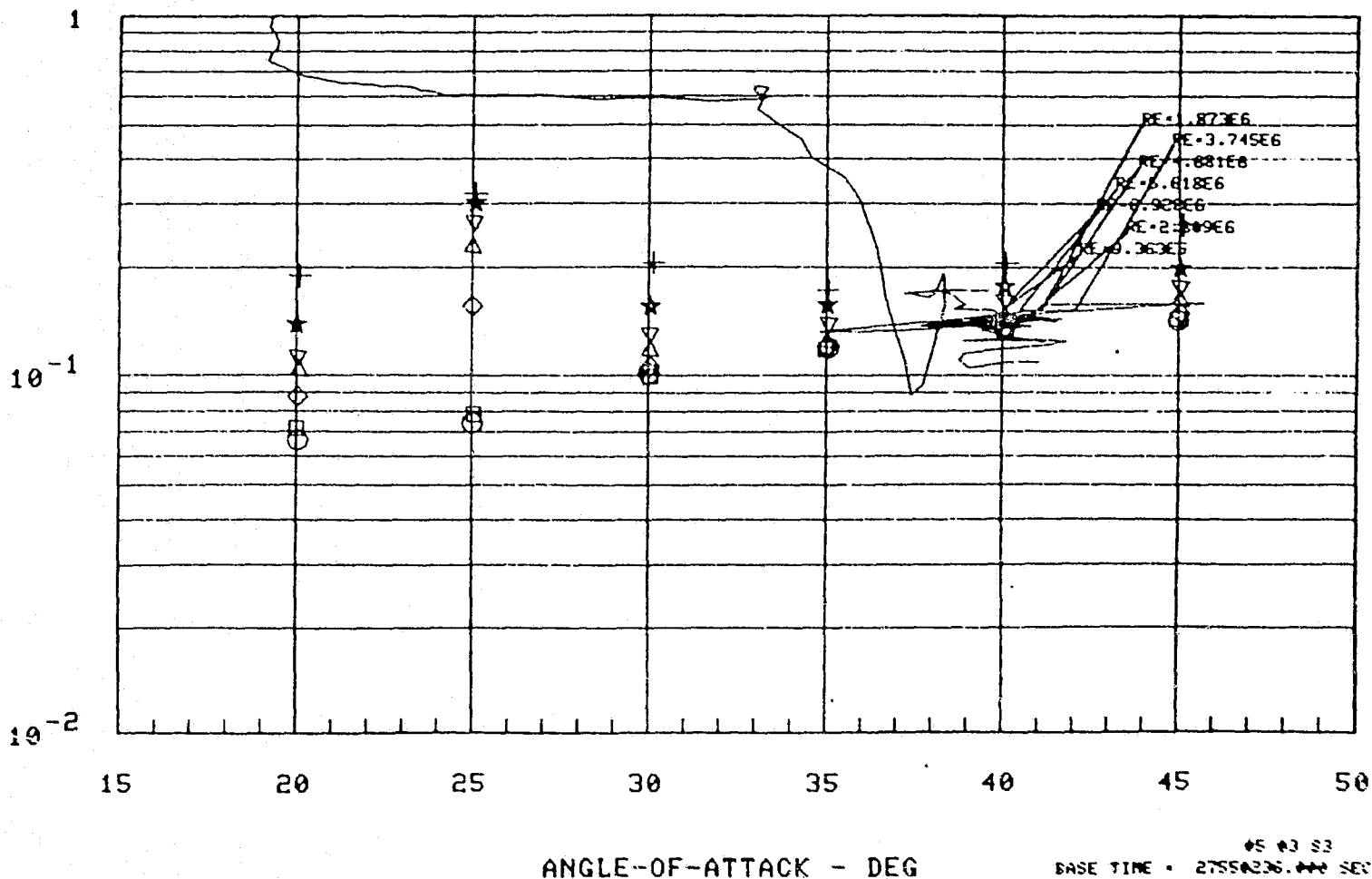
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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9710A/H-REF 200-1480 SEC

FILE COUNTE - I\I-CALL

B-337



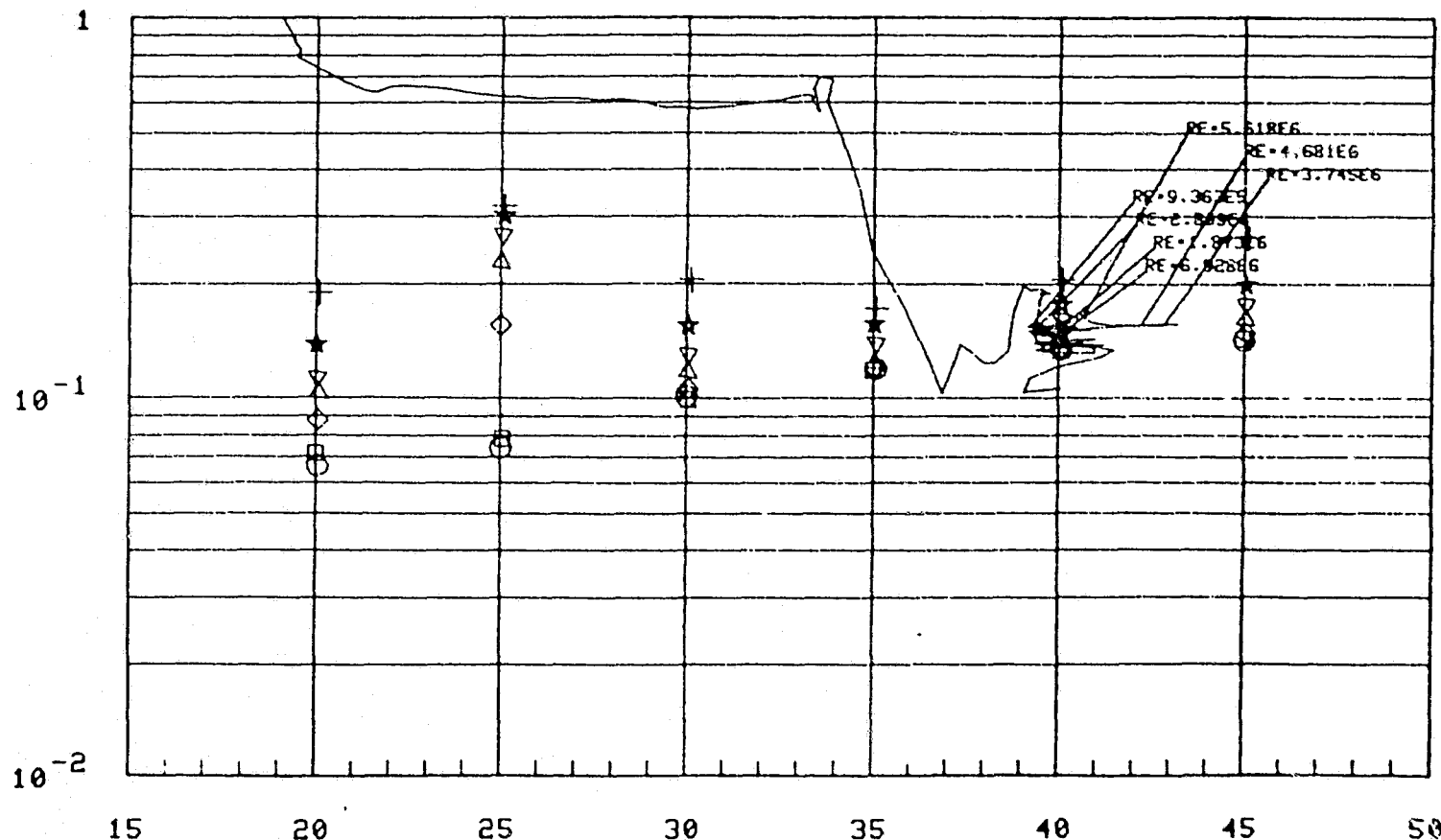
STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9710A/H-REF 200-1380 SEC

FILE CODE - H/H-REF



ANGLE-OF-ATTACK - DEG

05 03 S3
BASE TIME = 077456S4.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

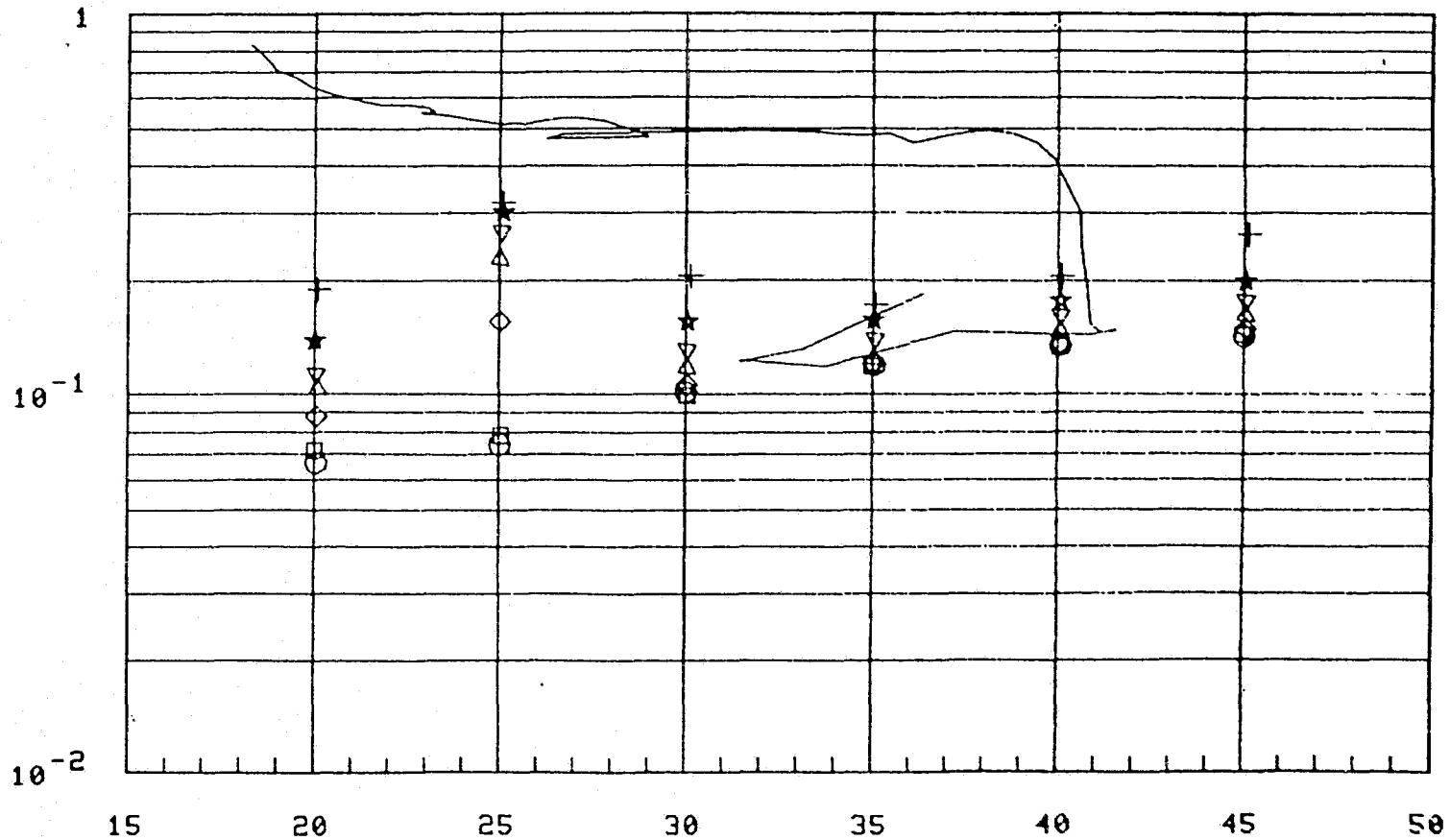
STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.52

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OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

U07T9710A/H-REF 965-1300 SEC

FILE COUNTE - H/H-REF



ANGLE-OF-ATTACK - DEG

05 03 32
BASE TIME • 16040423.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.52

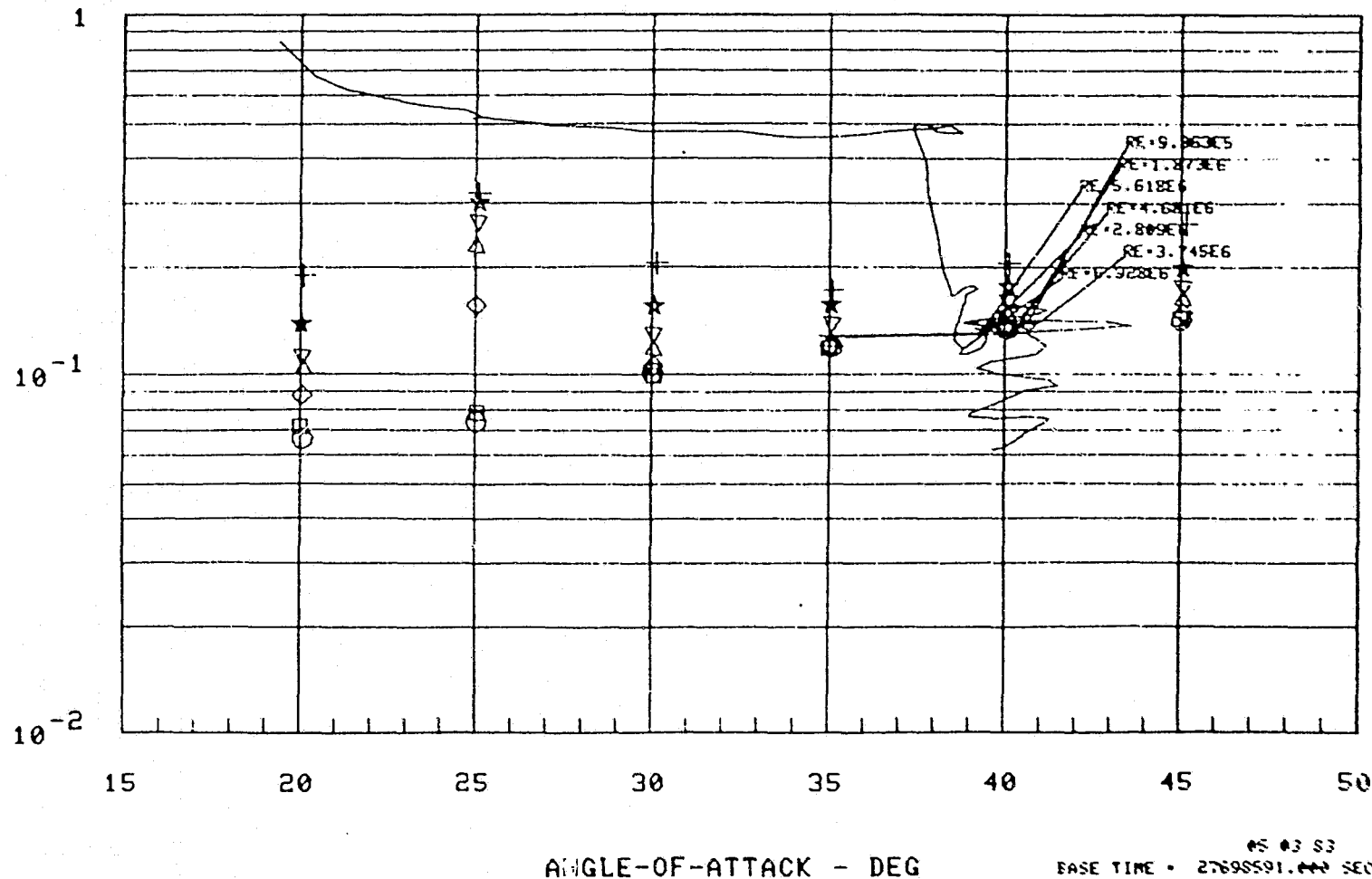
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OH39 0.0175 SCALE RE = 0.5 E06
 OH39 0.0175 SCALE RE = 1.0 E06
 OH39 0.0175 SCALE RE = 1.5 E06
 OH39 0.0175 SCALE RE = 2.0 E06
 OH39 0.0175 SCALE RE = 2.5 E06
 OH39 0.0175 SCALE RE = 3.0 E06
 OH39 0.0175 SCALE RE = 3.7 E06

U07T9710A/H-REF 150-1350 SEC

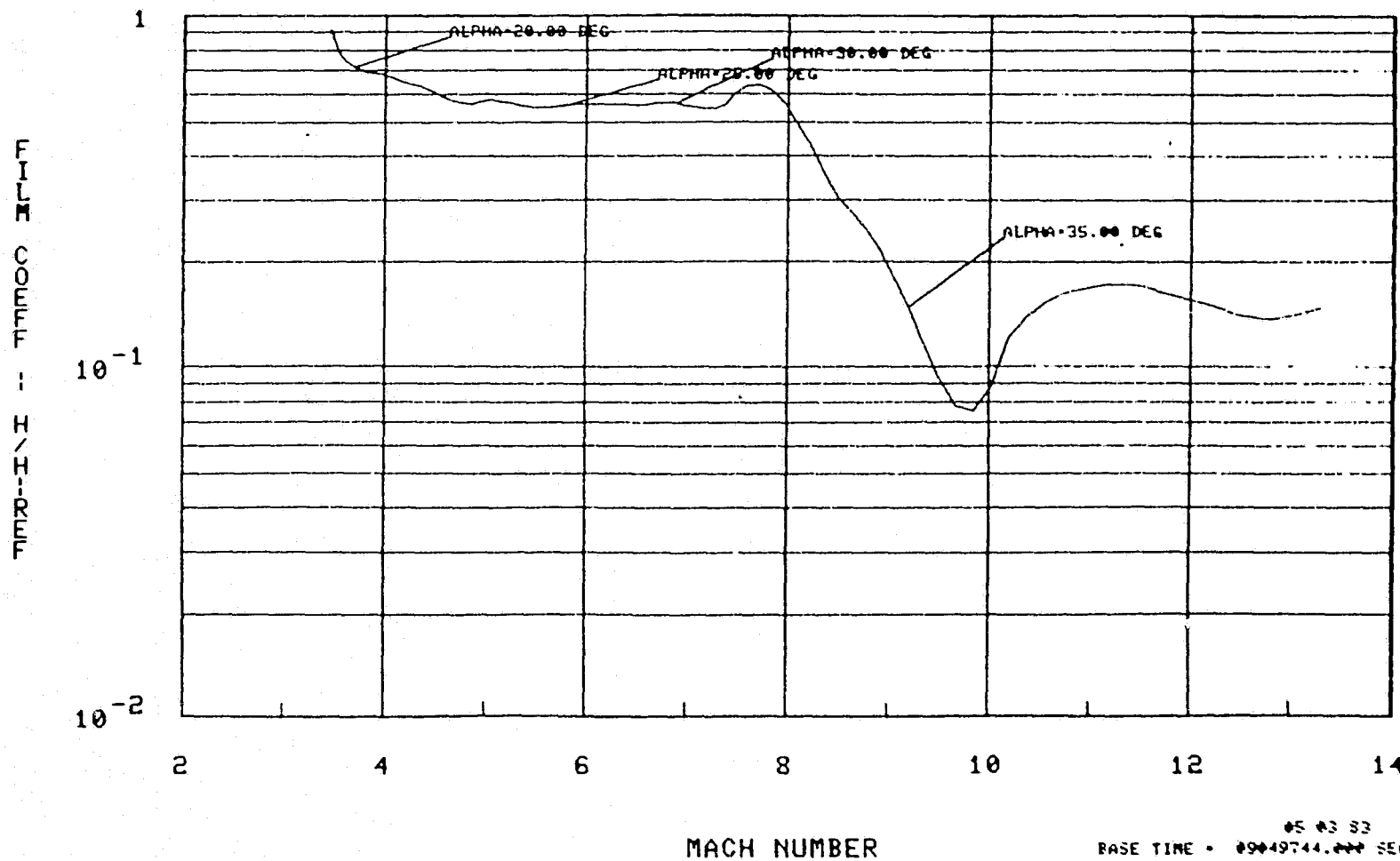
FILE CODE - H/H-REF

B-340



STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A/H-REF 1065-1460 SEC

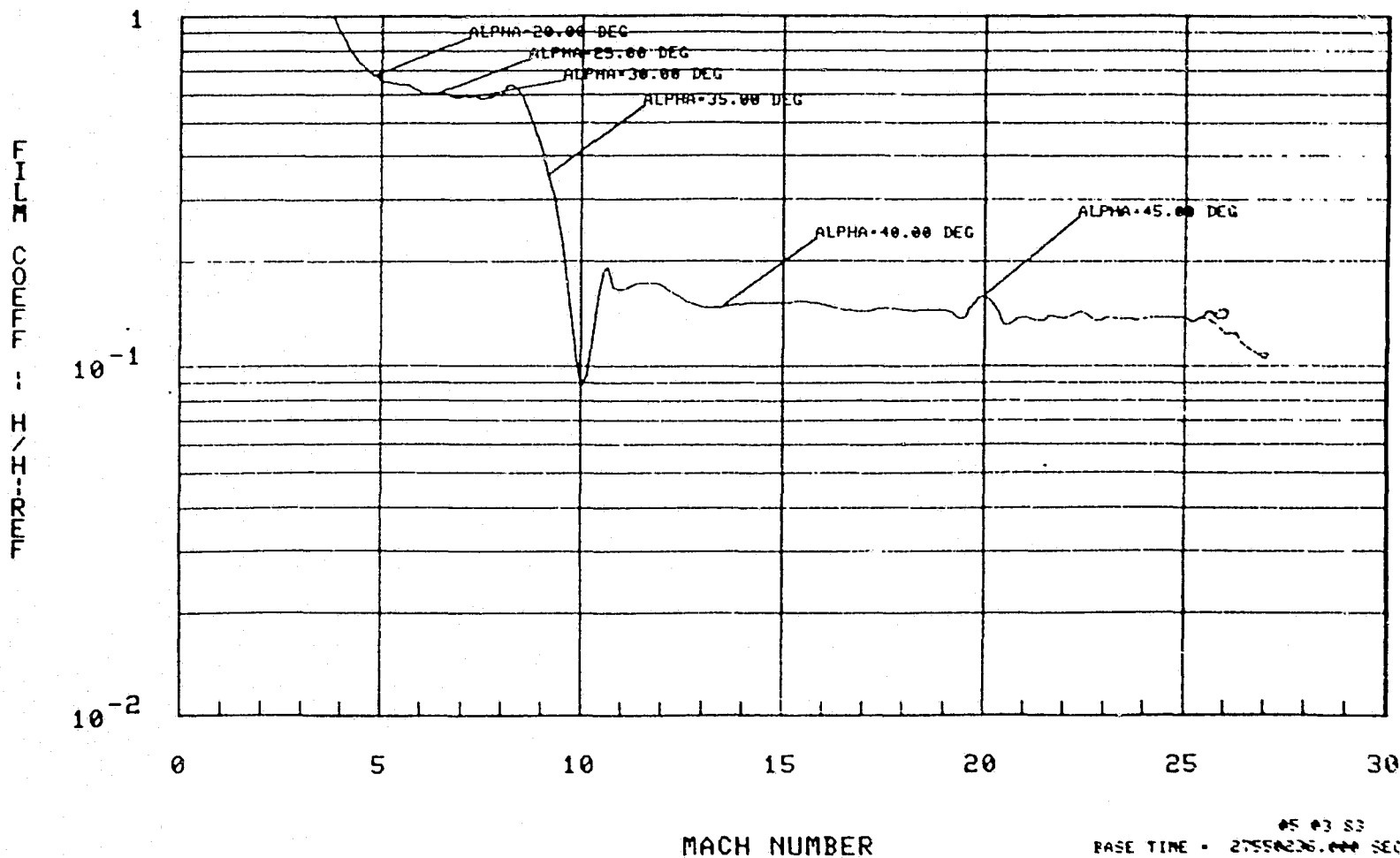


ORIGINAL PAGE IS
OF POOR QUALITY

B-341

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A/H-REF 200-1480 SEC

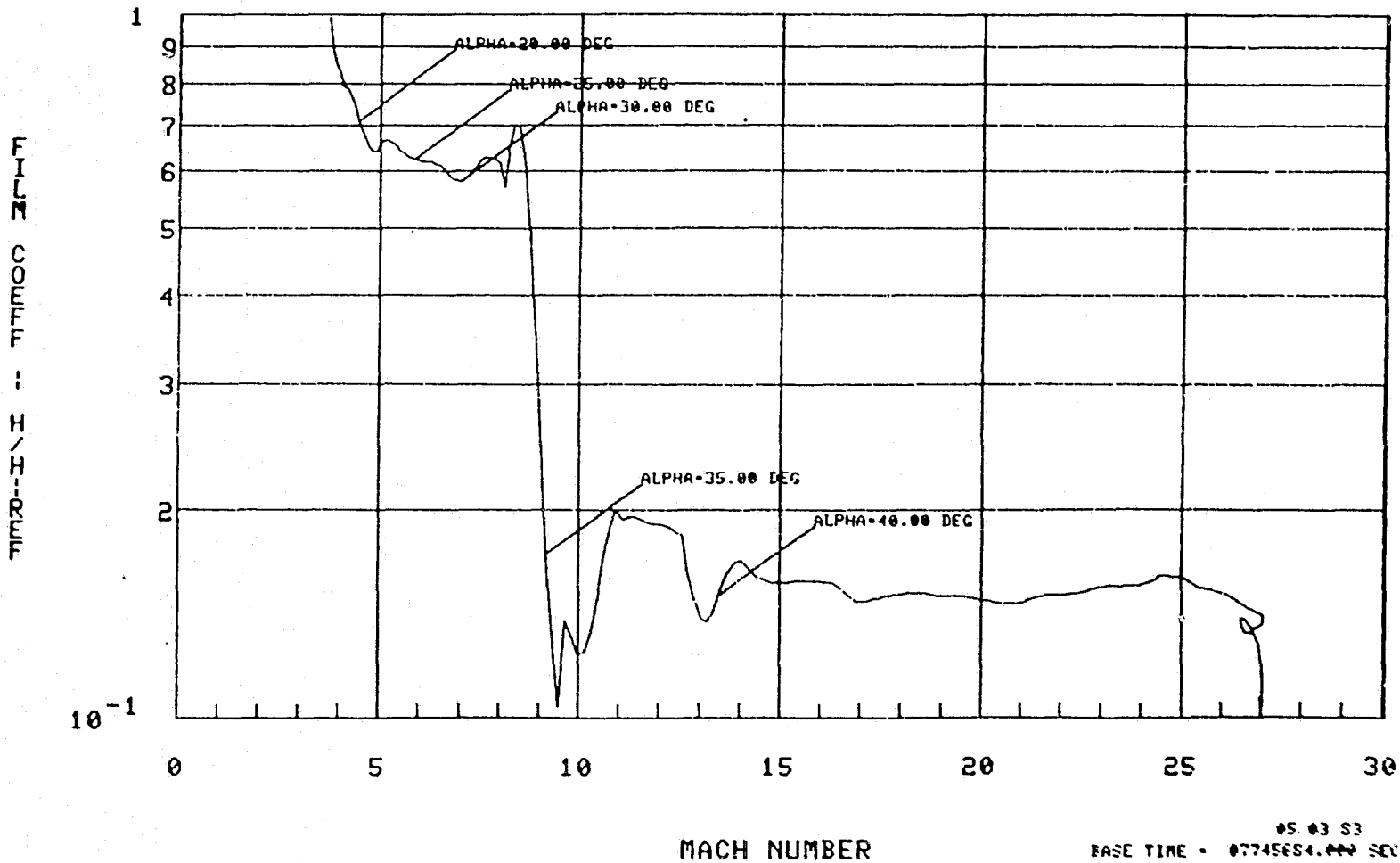


B-342

ORIGINAL PAGE IS
OF POOR QUALITY

STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

U07T9710A/H-REF 200-1380 SEC



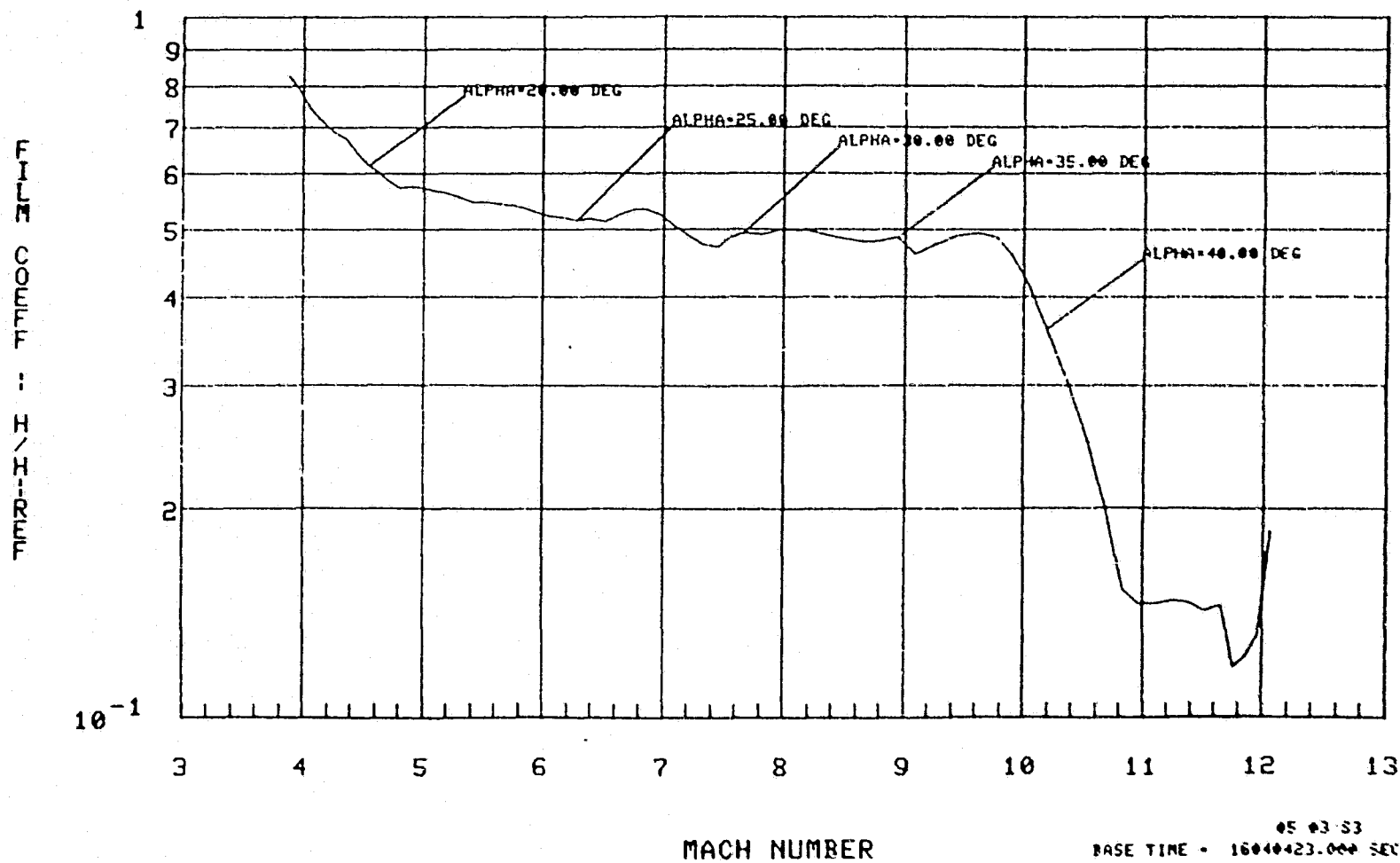
B-343

ORIGINAL PAGE IS
OF POOR QUALITY

05 03 S3
BASE TIME = 077456S4.000 SEC.

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.52

W07T9710A/H-REF 965-1300 SEC

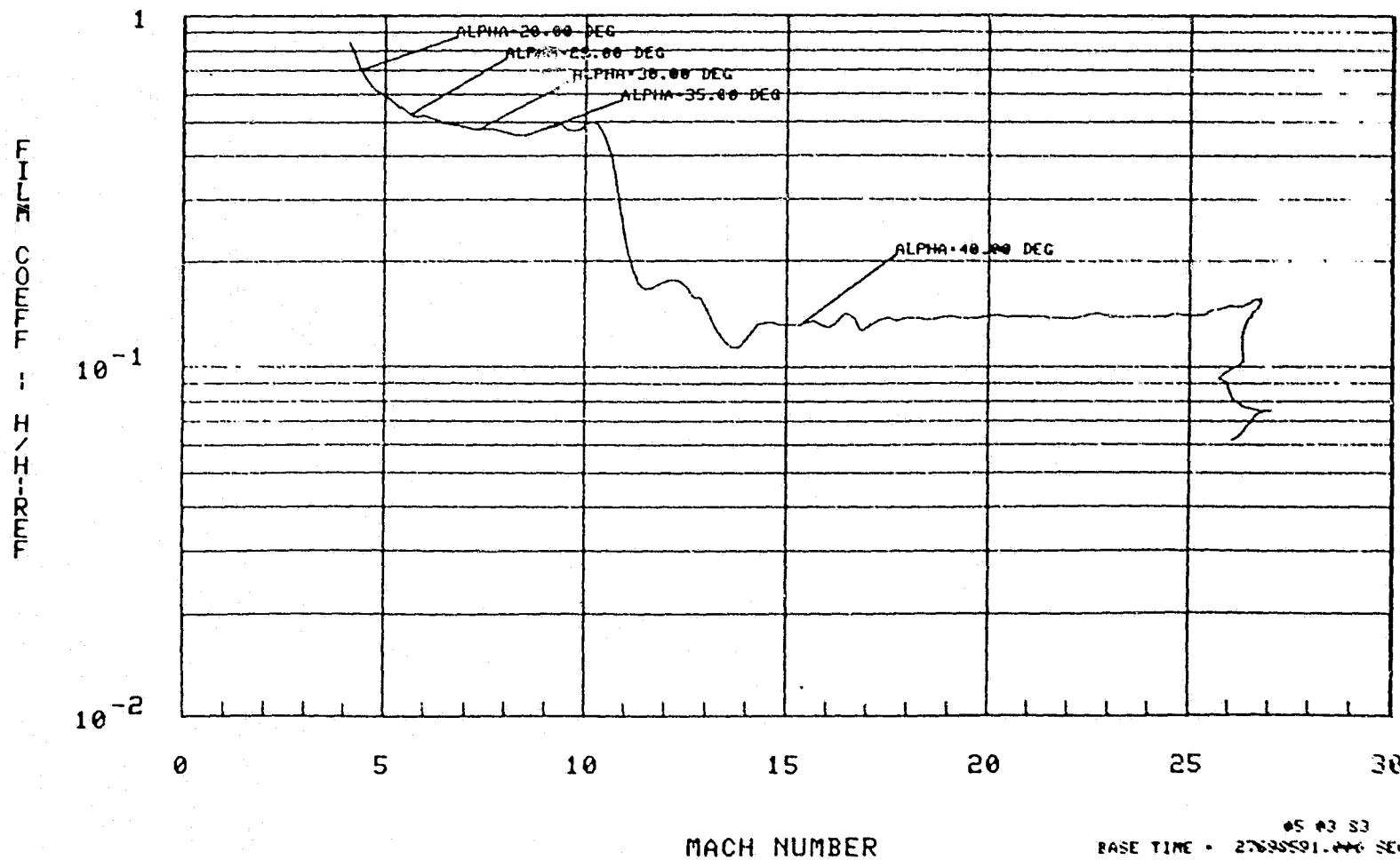


B-344

ORIGINAL PAGE 11
OF POOR QUALITY

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A/H-REF 150-1350 SEC



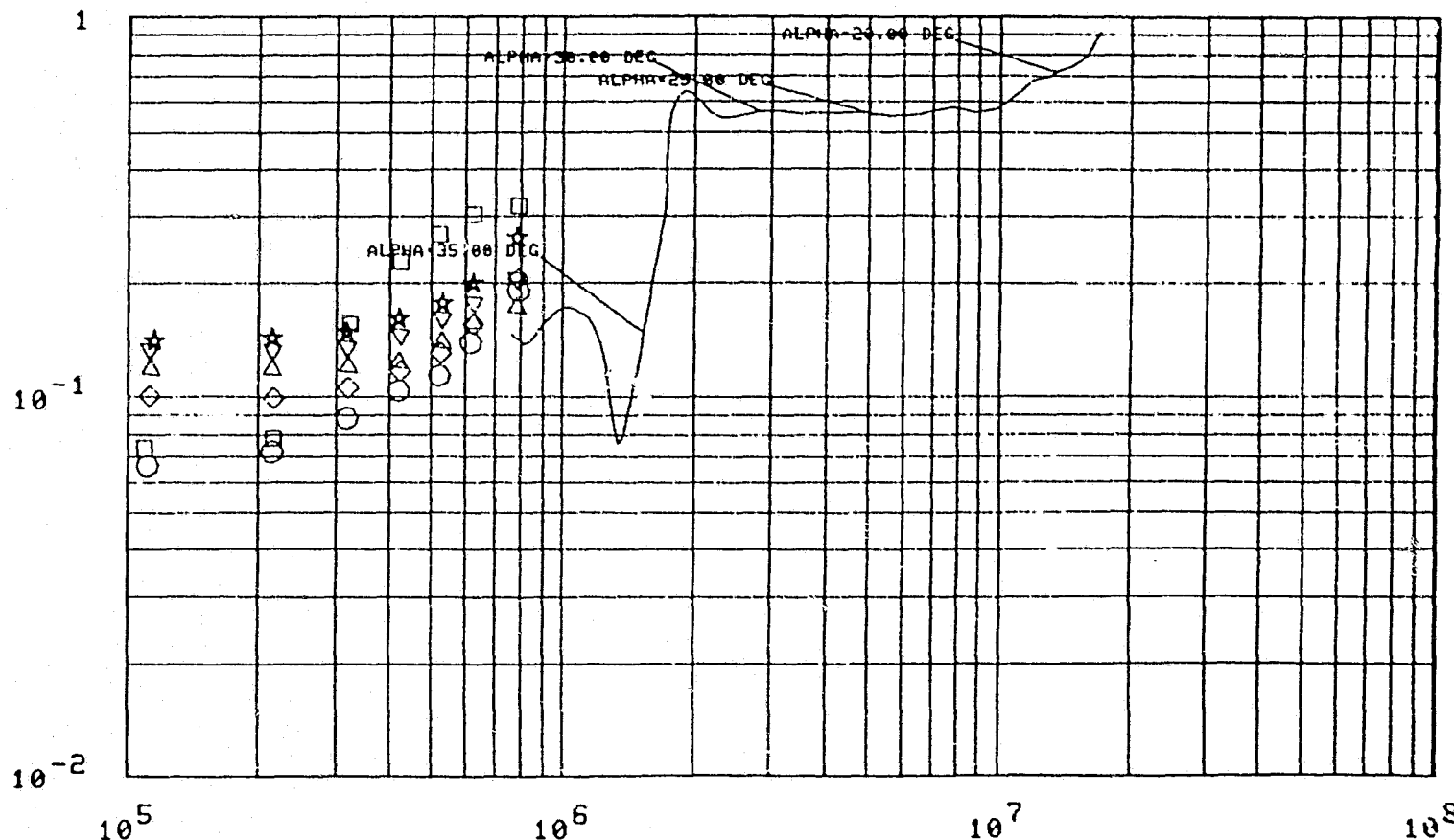
STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.52

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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9710A/H-REF 1065-1460 SEC

LINE CODE - I/I-2ULL



REYNOLDS NUMBER (NS)

BASE TIME = 09049744.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

B-346

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

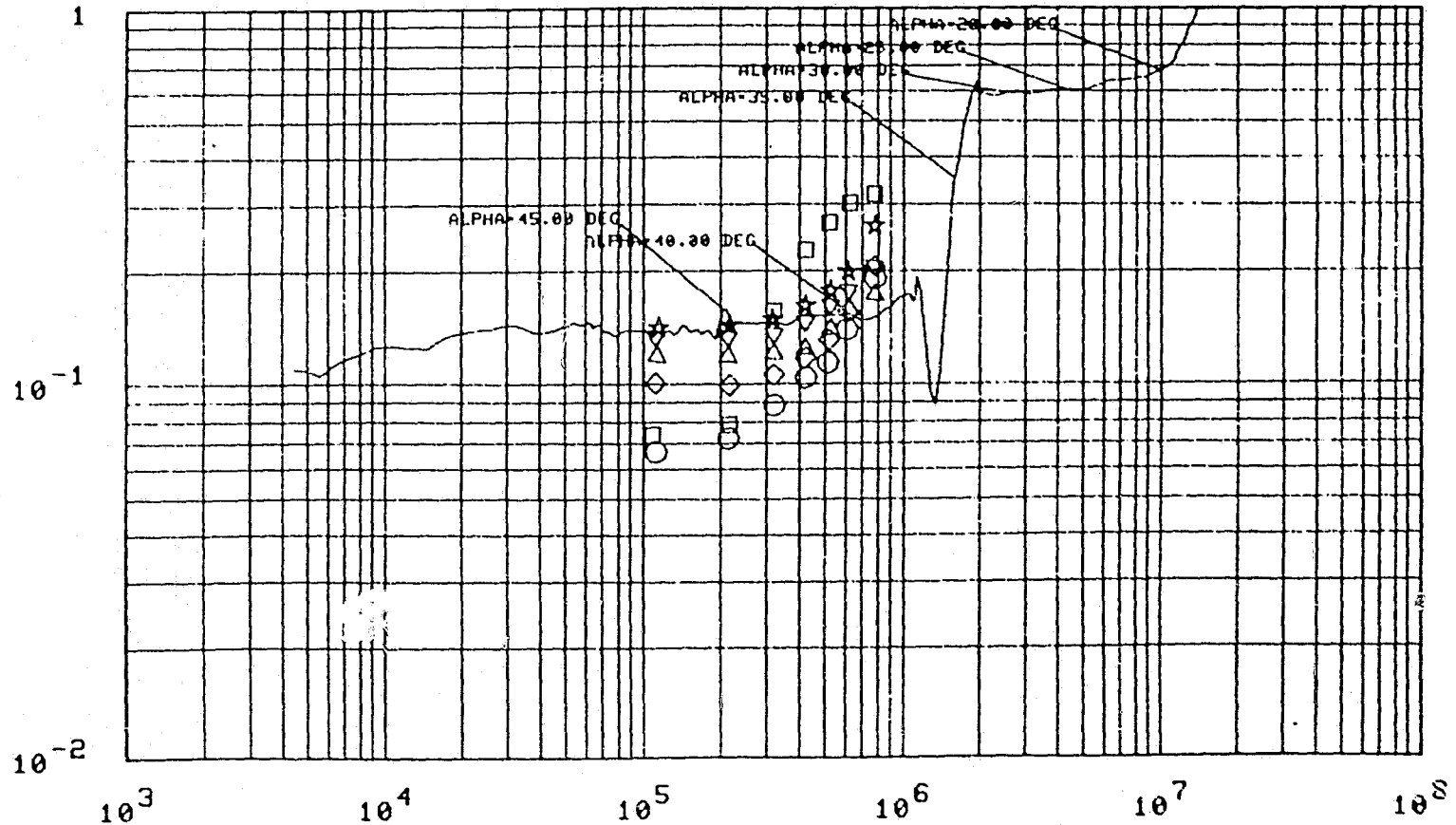
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9710A/H-REF 200-1480 SEC

FILE CODE - H/H-REF

ORIGINAL PLOT OF
OF POOR QUALITY



REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME • 275502.000 SEC.

B-347

STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

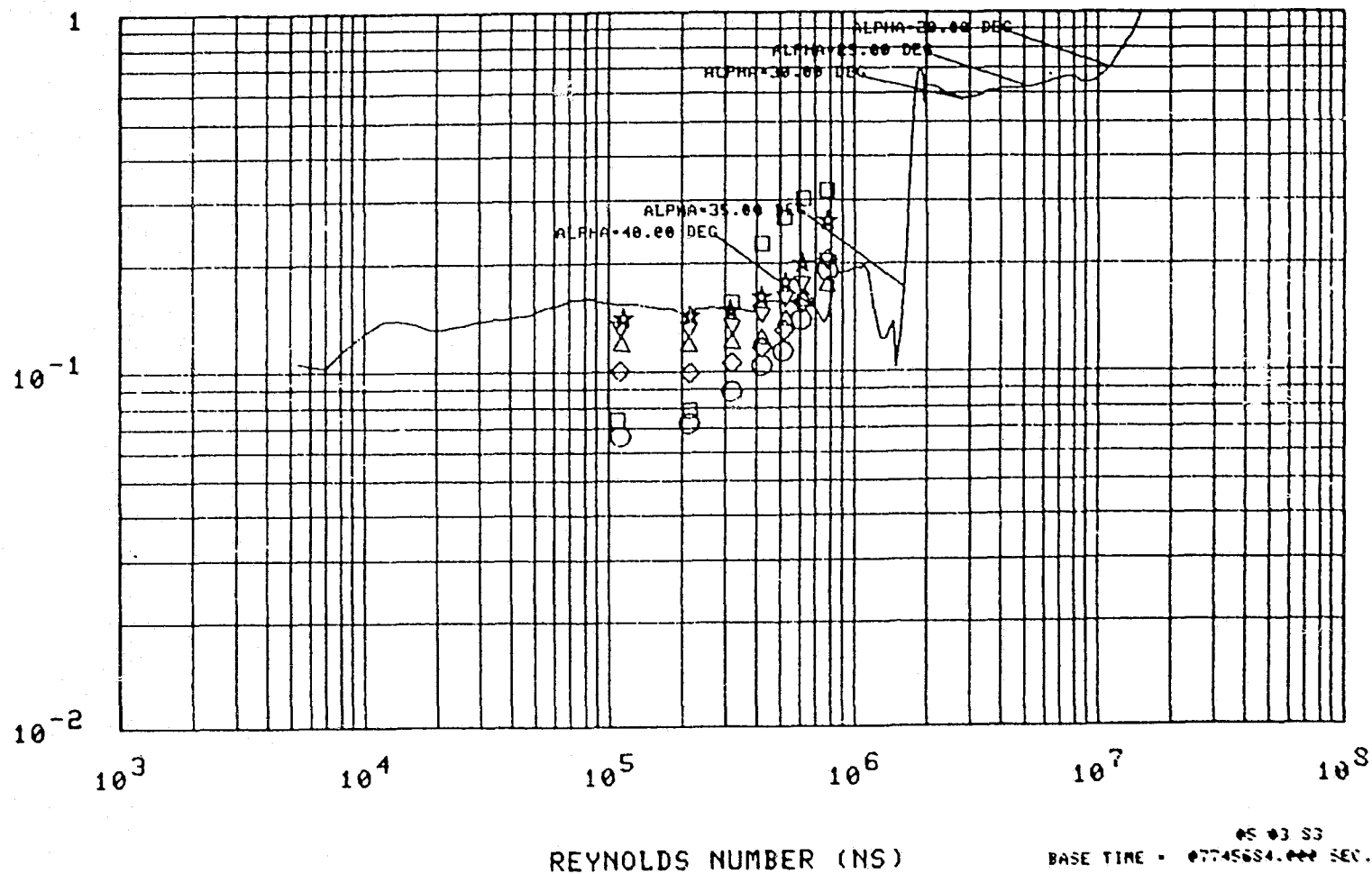
U07T9710A/H-REF 200-1380 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

FILE CODE: H/H-KULL

B-348



ORIGINAL PAGE IS
OF POOR QUALITY

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.52

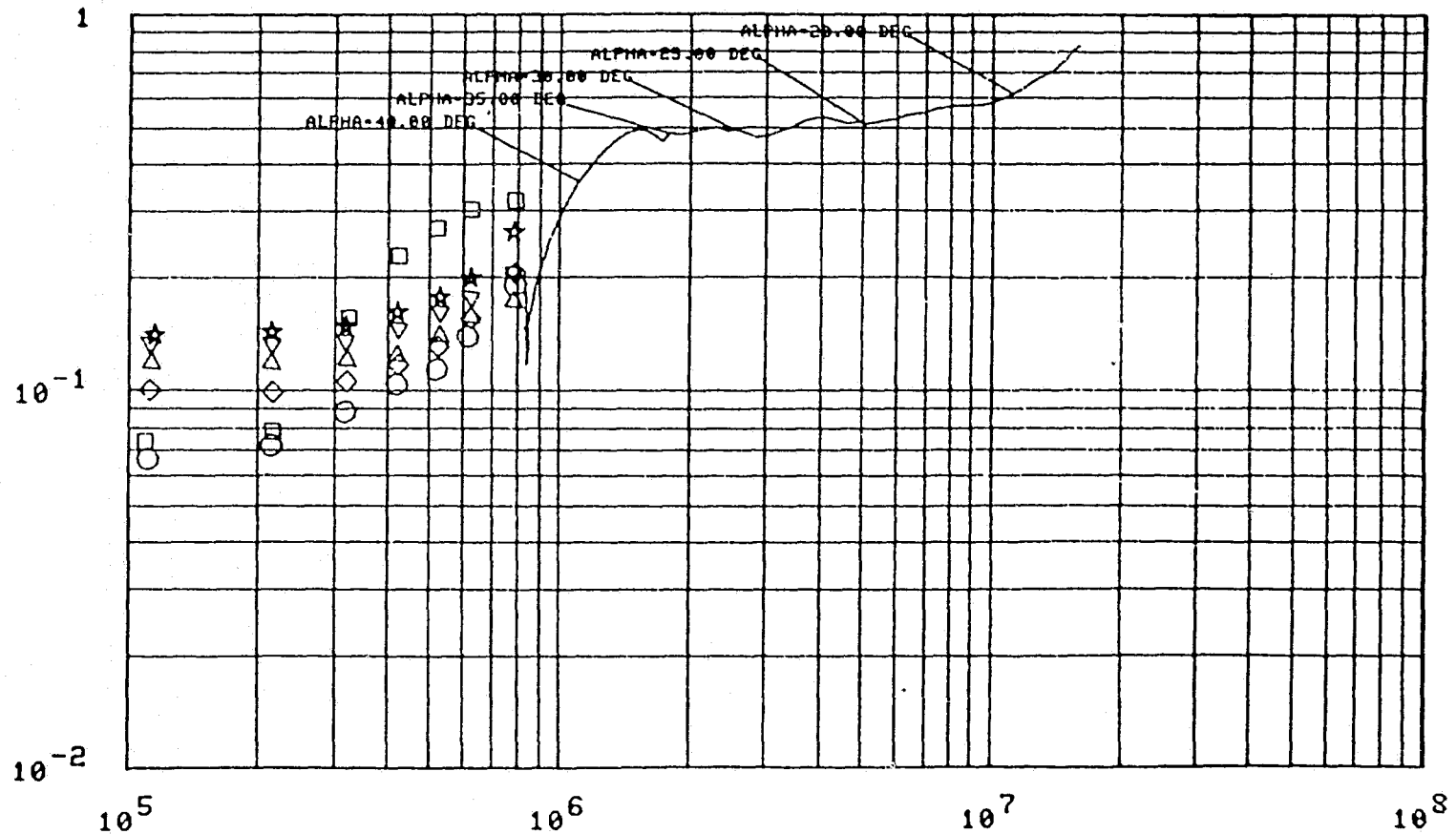
U07T9710A/H-REF 965-1300 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

FILE CODE: H/H-REF

ORIGINAL PAGE IS
OF POOR QUALITY



REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME • 16040423.000 SEC.

B-349

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.52

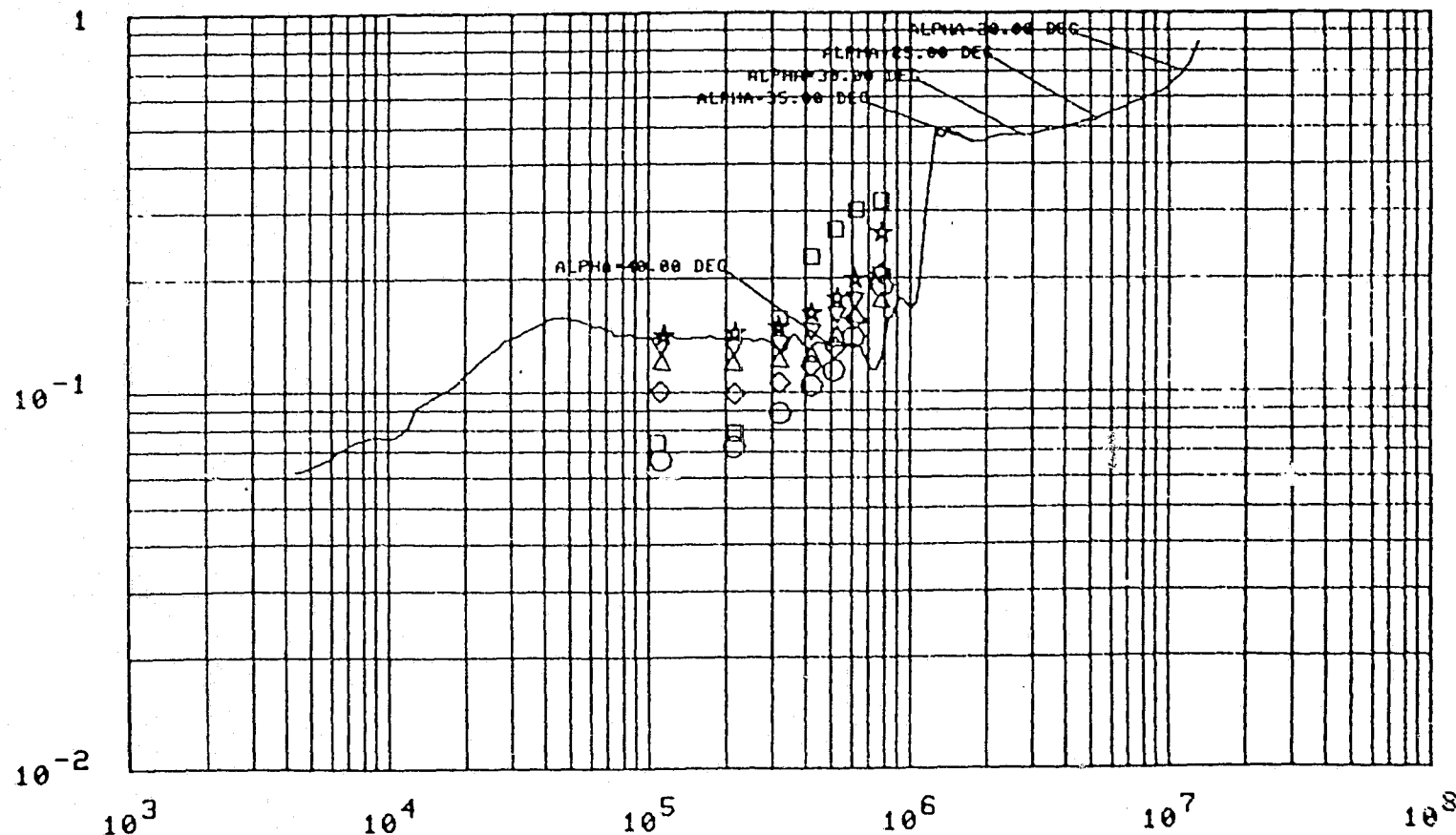
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9710A/H-REF 150-1350 SEC

FILE CODE: H/H-REF

B-350



ORIGINAL PAGE IS
OF POOR QUALITY

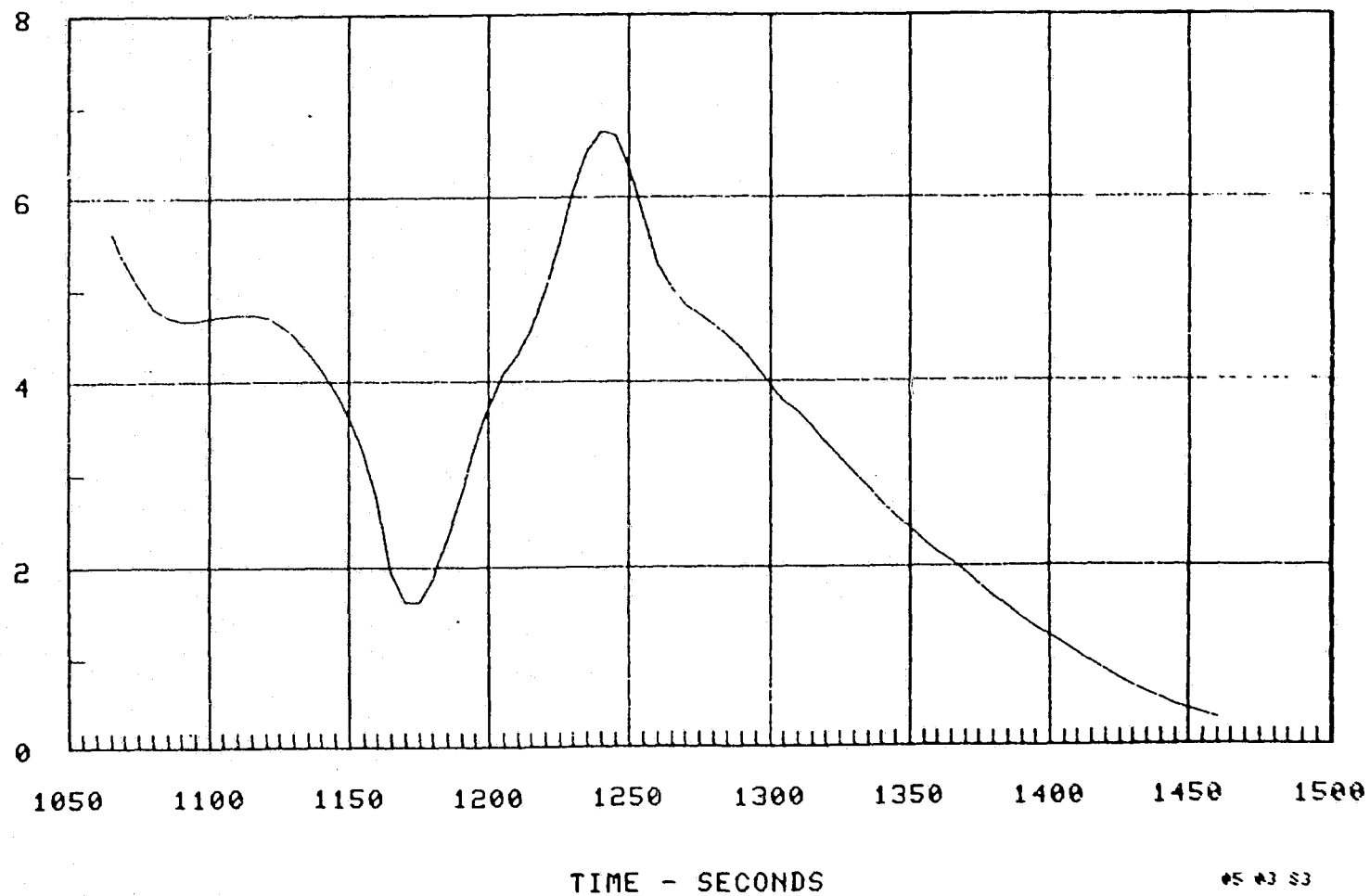
REYNOLDS NUMBER (NS)

BASE TIME = 27.98591.000 SEC.

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

U07T9710A

HEATING RATE - BULB TEMPERATURE - SEC



ORIGINAL PAGE IS
OF POOR QUALITY

B-351

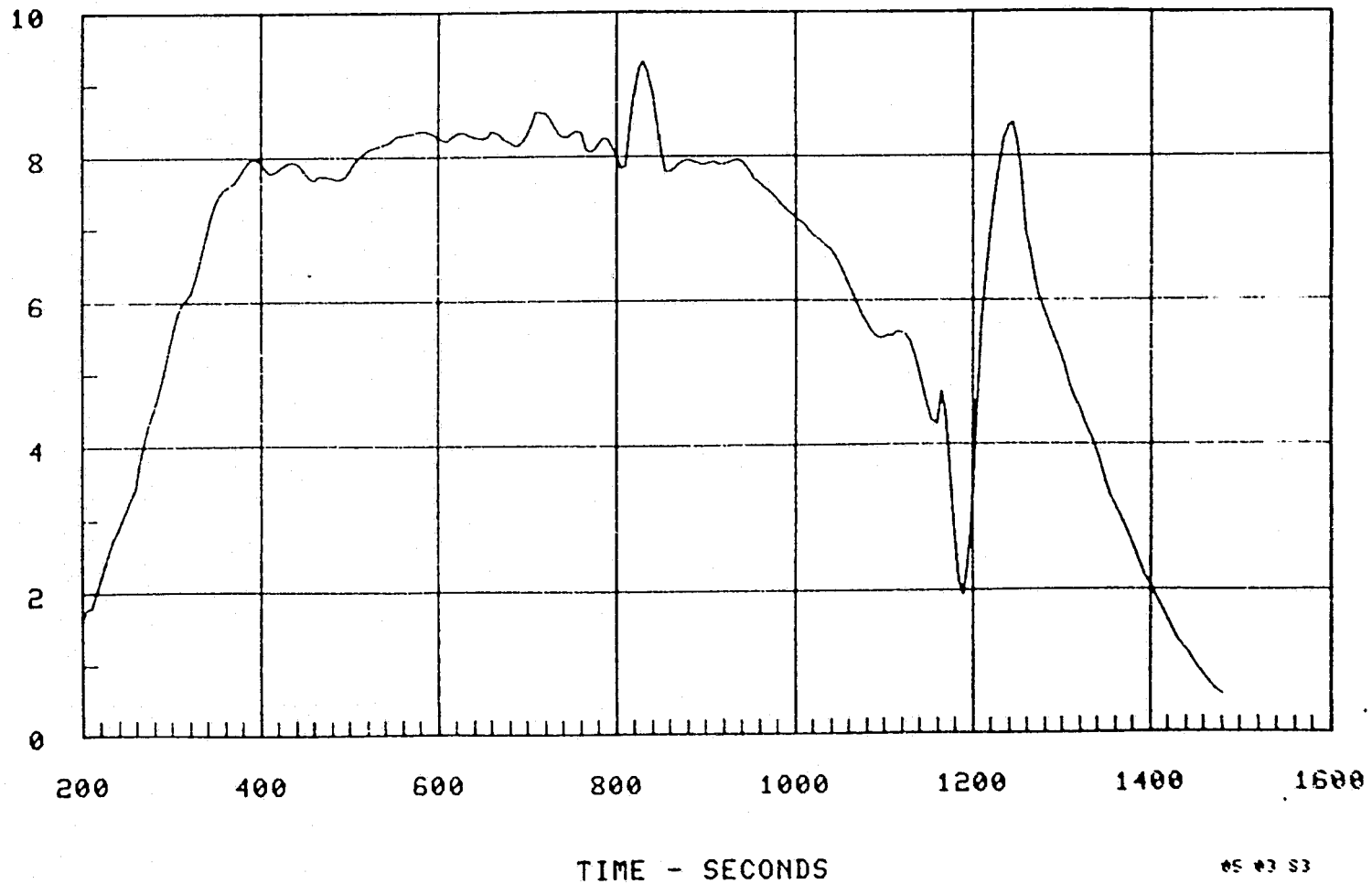
#5 #3 S3

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A

HEATING RATE - BLEEDING - SMO

B-352



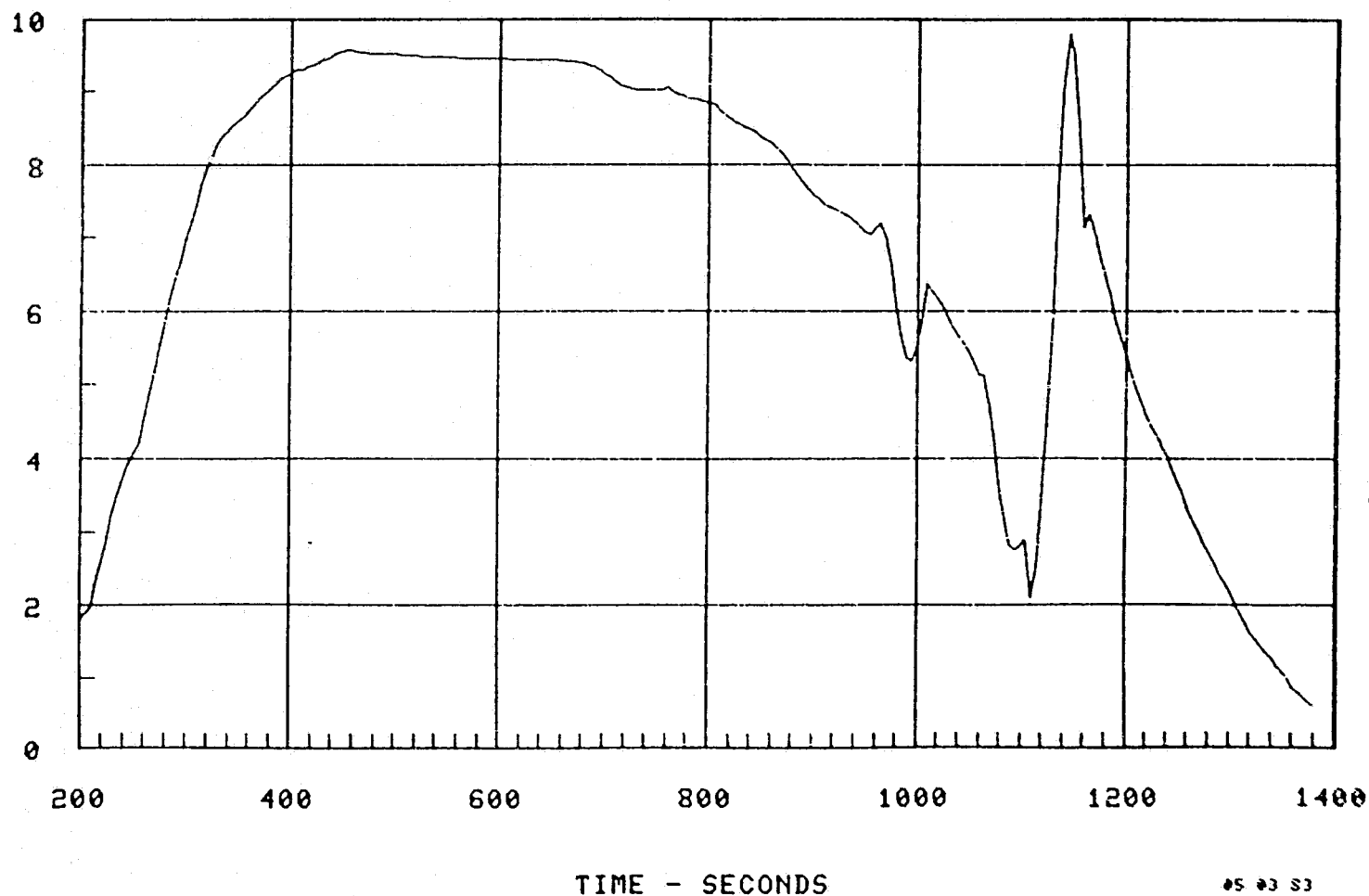
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05 43 S3

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A

HEATING RATE - BTU/FT**2 - SEC



ORIGINAL PAGE IS
OF POOR QUALITY

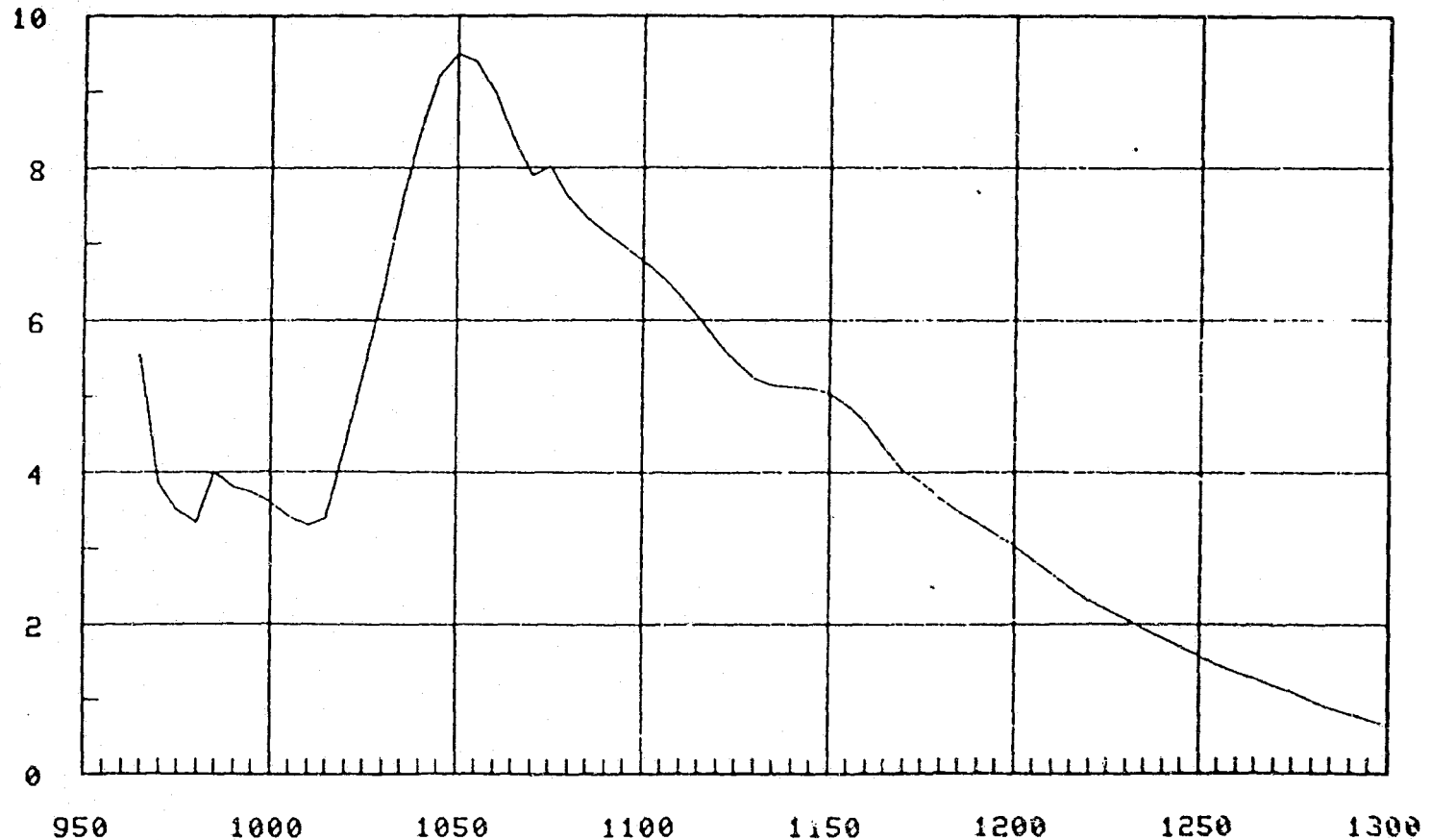
B-353

05 03 53

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

U07T9710A

HEATING RATE - BTU/IN² - SEC



TIME - SECONDS

05 03 83

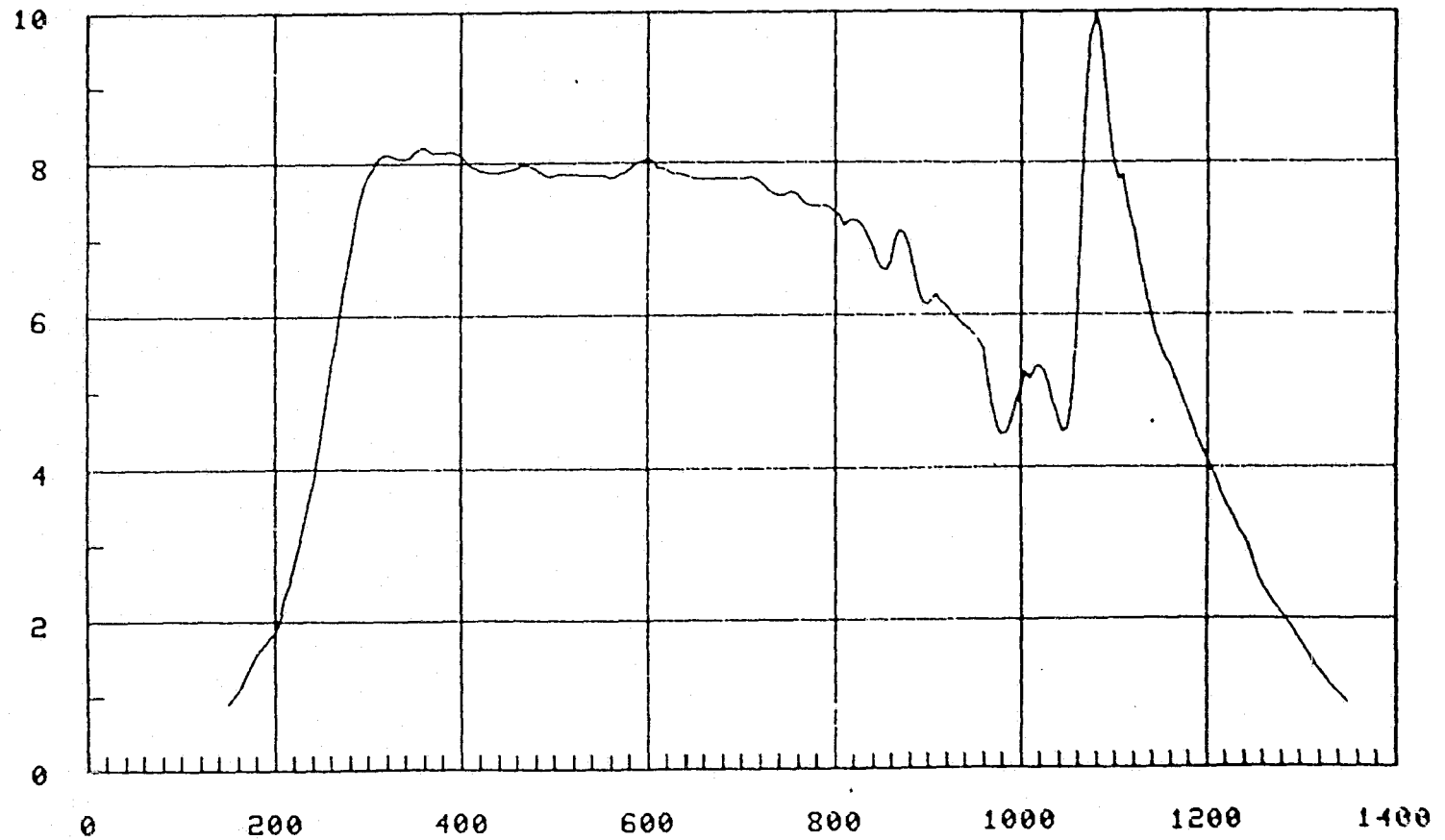
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B-354

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

U07T9710A

HEATING RATE - BULB TEMPERATURE - SEC



TIME - SECONDS

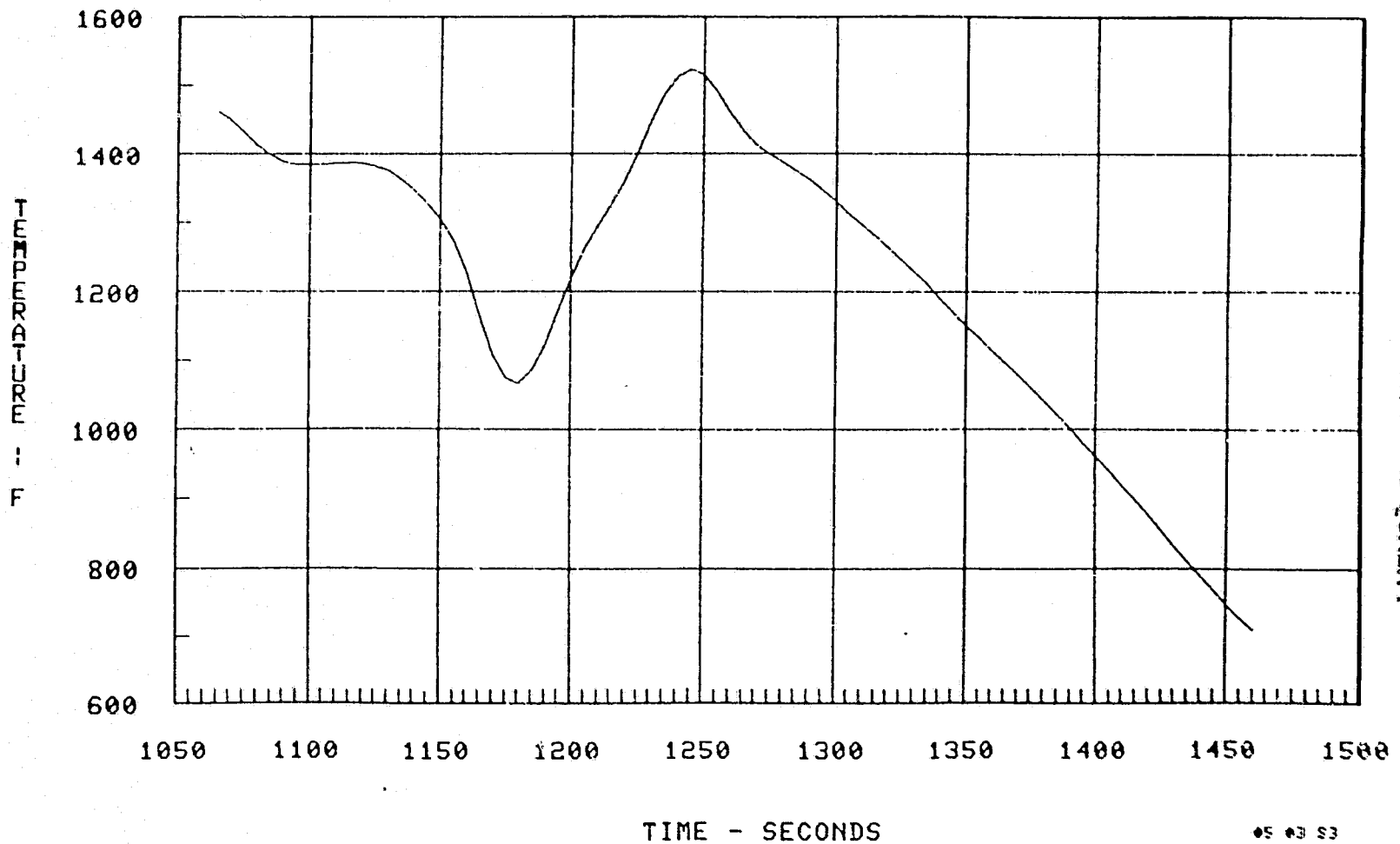
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B-355

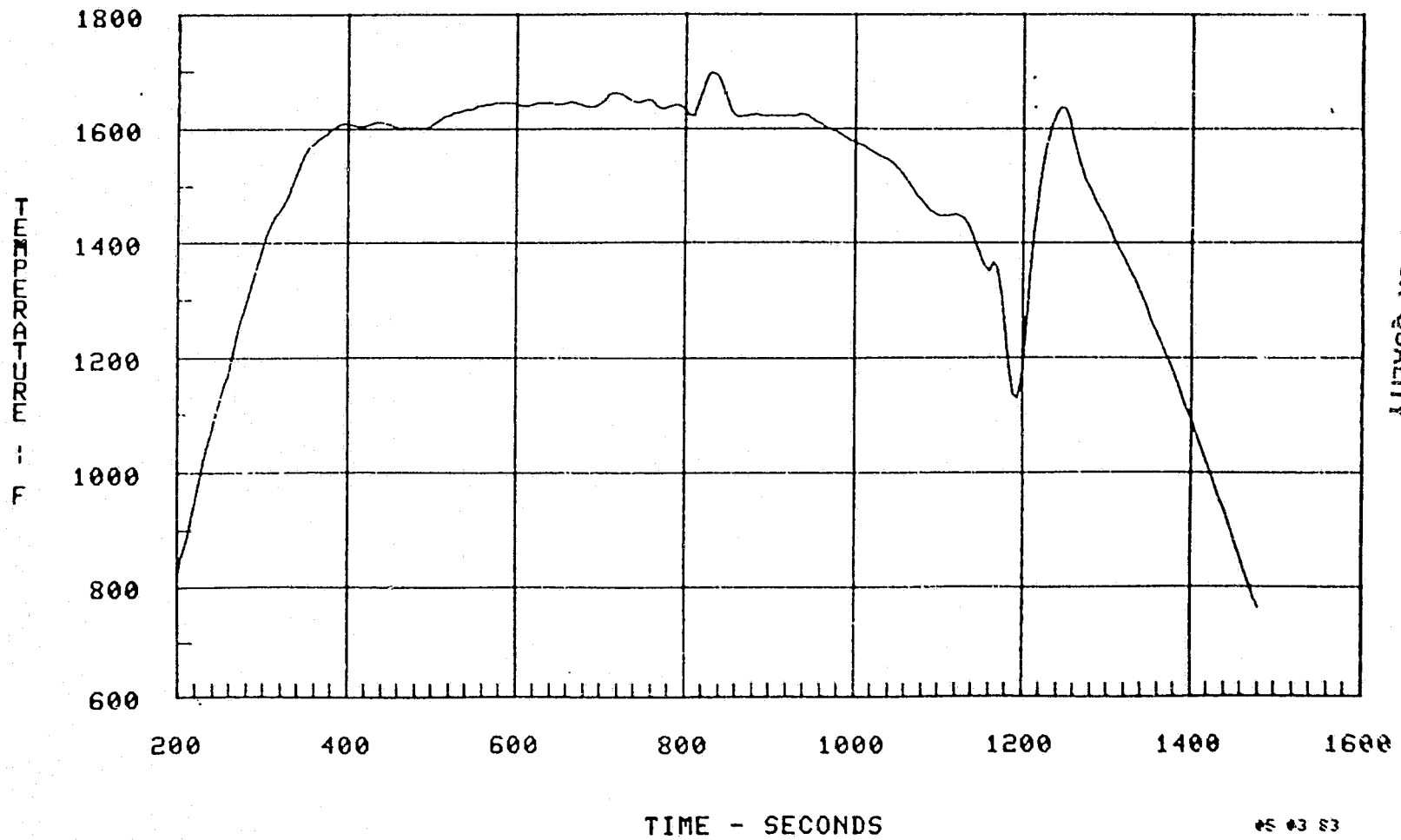
STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A



STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

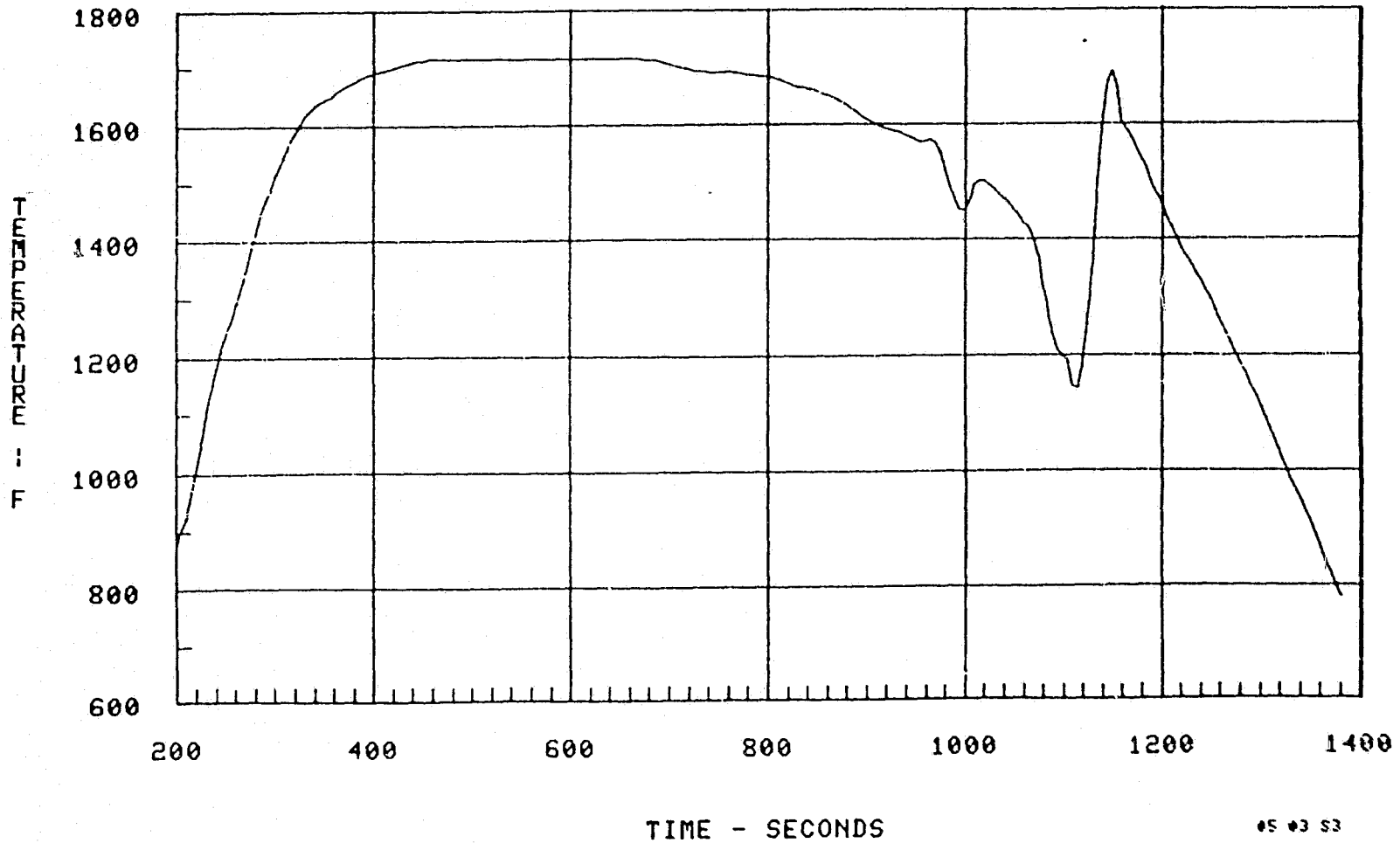
U07T9710A



B-357

STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

U87T9710A



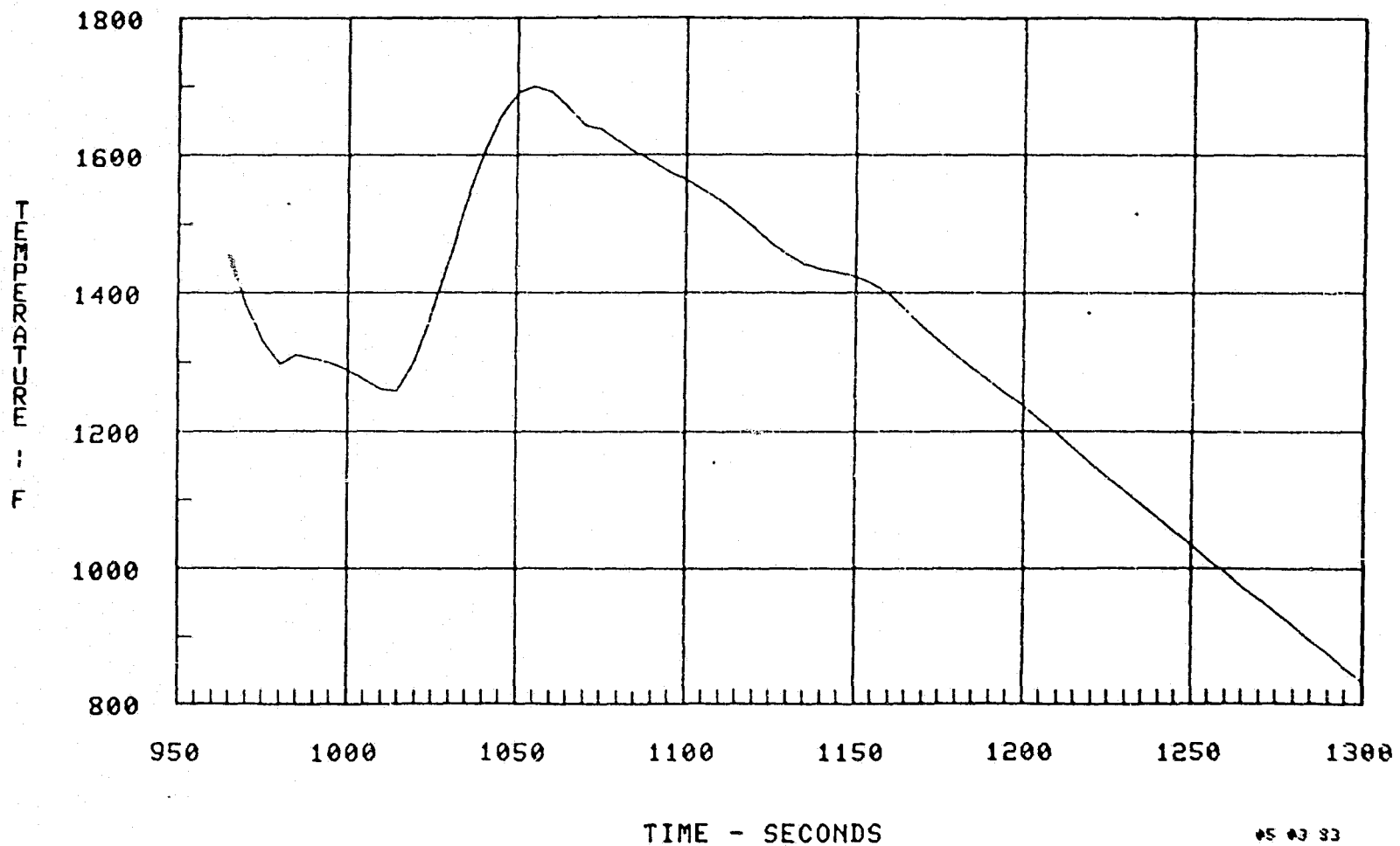
B-358

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05 03 53

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.52

U07T9710A

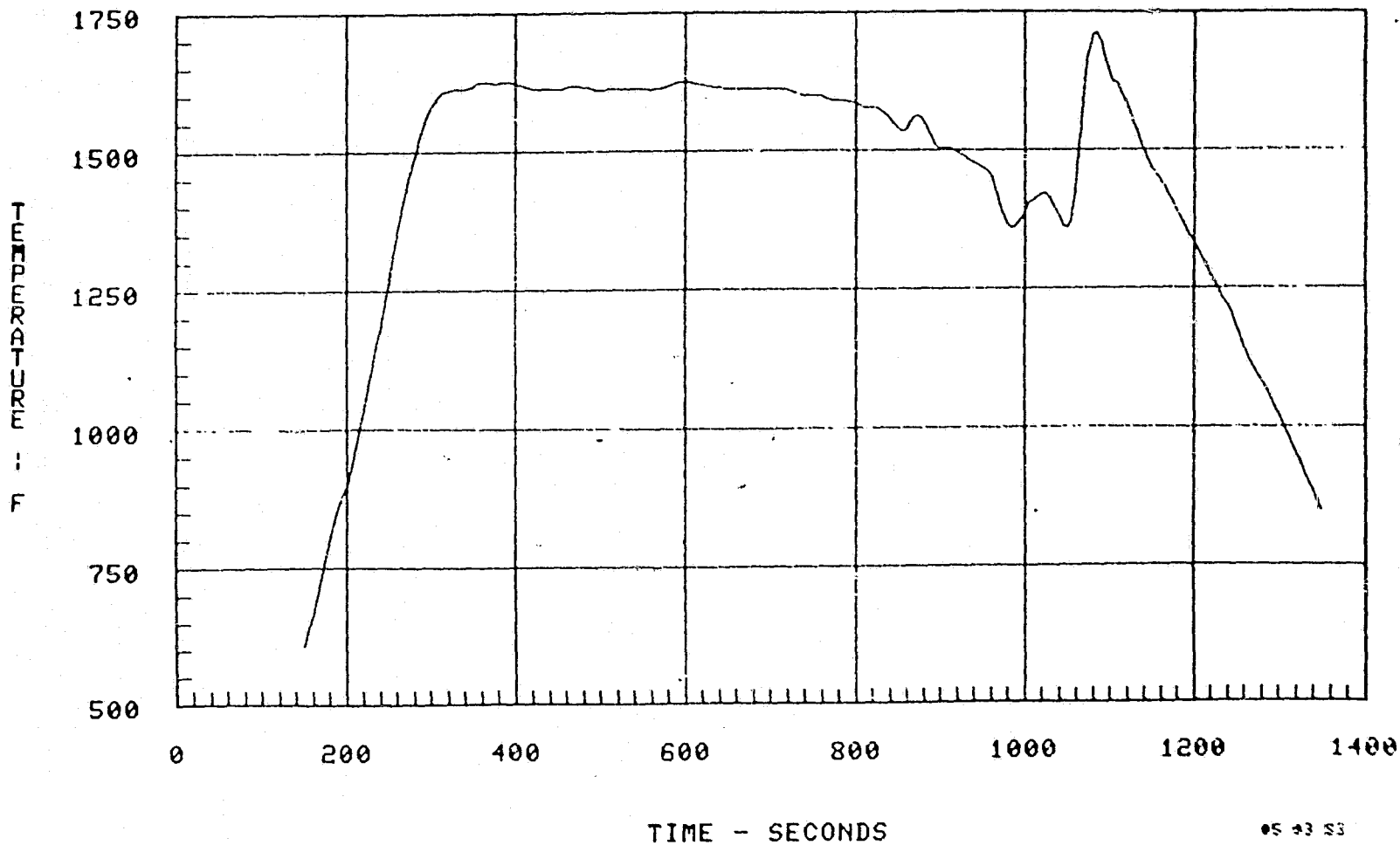


B-359

#5 #3 33

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.52$

U07T9710A



ORIGINAL PAGE IS
OF POOR QUALITY

05 43 53

B-360

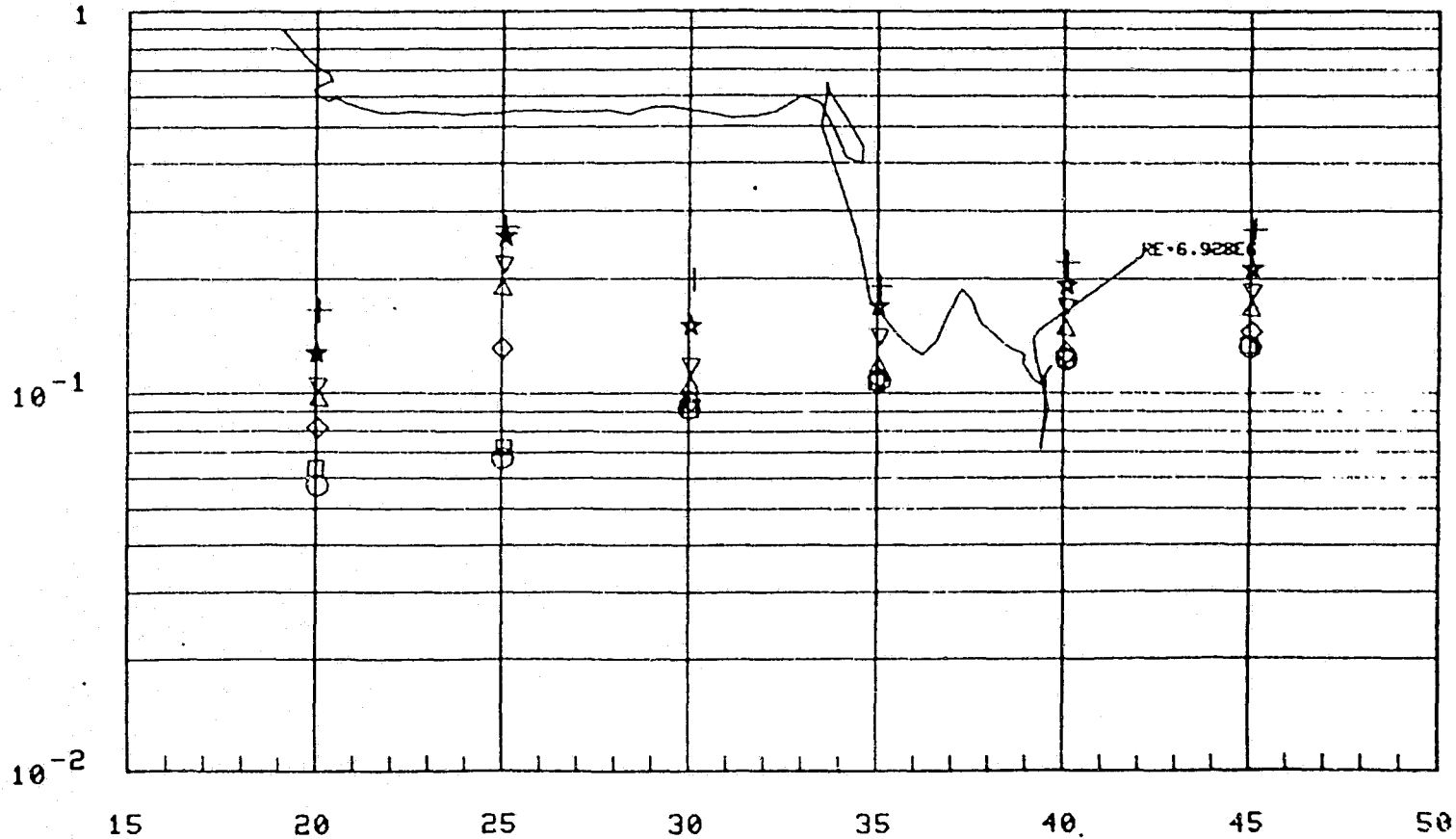
STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9711A/H-REF 1065-14E0 SEC

LINE COUNT - I/I-RULL



ORIGINAL FILE IS
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ANGLE-OF-ATTACK - DEG

BASE TIME = 00:49:44.000 SEC.

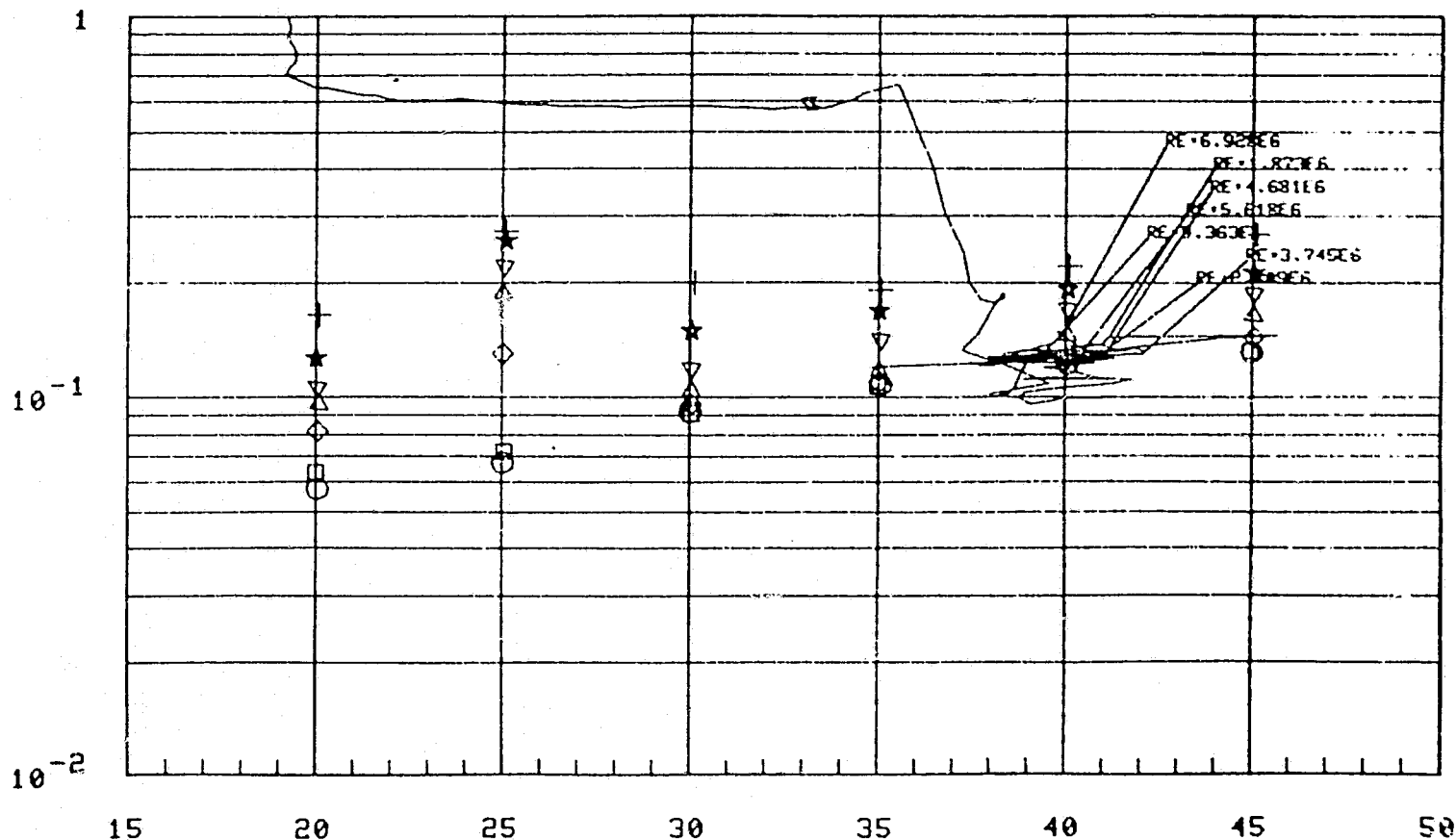
STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE = 0.5 E06
OH39 0.0175 SCALE RE = 1.0 E06
OH39 0.0175 SCALE RE = 1.5 E06
OH39 0.0175 SCALE RE = 2.0 E06
OH39 0.0175 SCALE RE = 2.5 E06
OH39 0.0175 SCALE RE = 3.0 E06
OH39 0.0175 SCALE RE = 3.7 E06

U07T9711A/H-REF 200-1480 SEC

FILE COWELL - I/I-RULL



ORIGINAL PAGE IS
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ANGLE-OF-ATTACK - DEG

BASE TIME = 27554236.644 SEC.

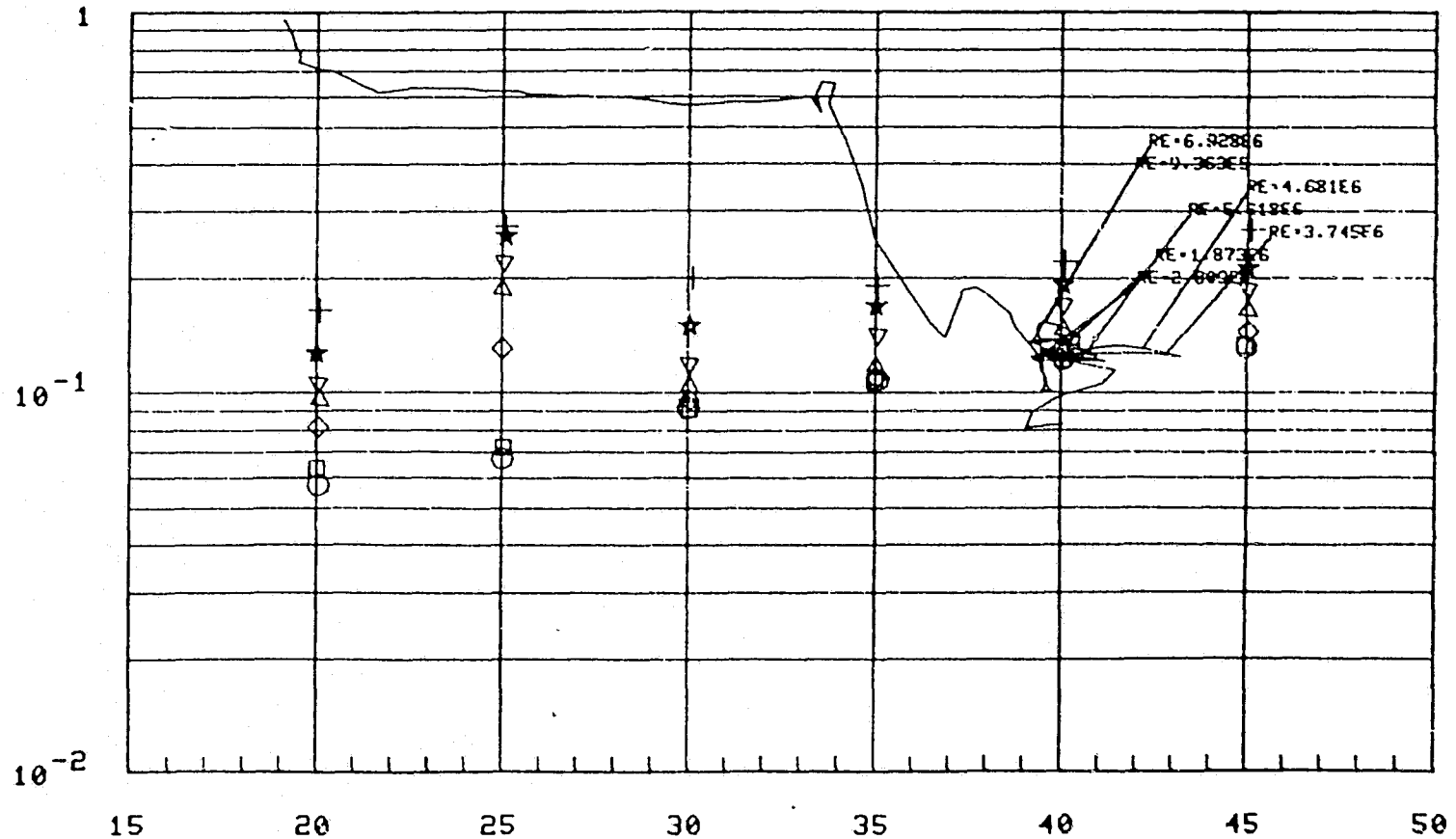
STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE • 0.5 E06
OH39 0.0175 SCALE RE • 1.0 E06
OH39 0.0175 SCALE RE • 1.5 E06
OH39 0.0175 SCALE RE • 2.0 E06
OH39 0.0175 SCALE RE • 2.5 E06
OH39 0.0175 SCALE RE • 3.0 E06
OH39 0.0175 SCALE RE • 3.7 E06

U07T9711A/H-REF 200-1380 SEC

FILE COWELL - H/H-CWILL



ORIGINAL PAGE IS
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05 03 S3
BASE TIME • 077456S4.000 SEC.

B-363

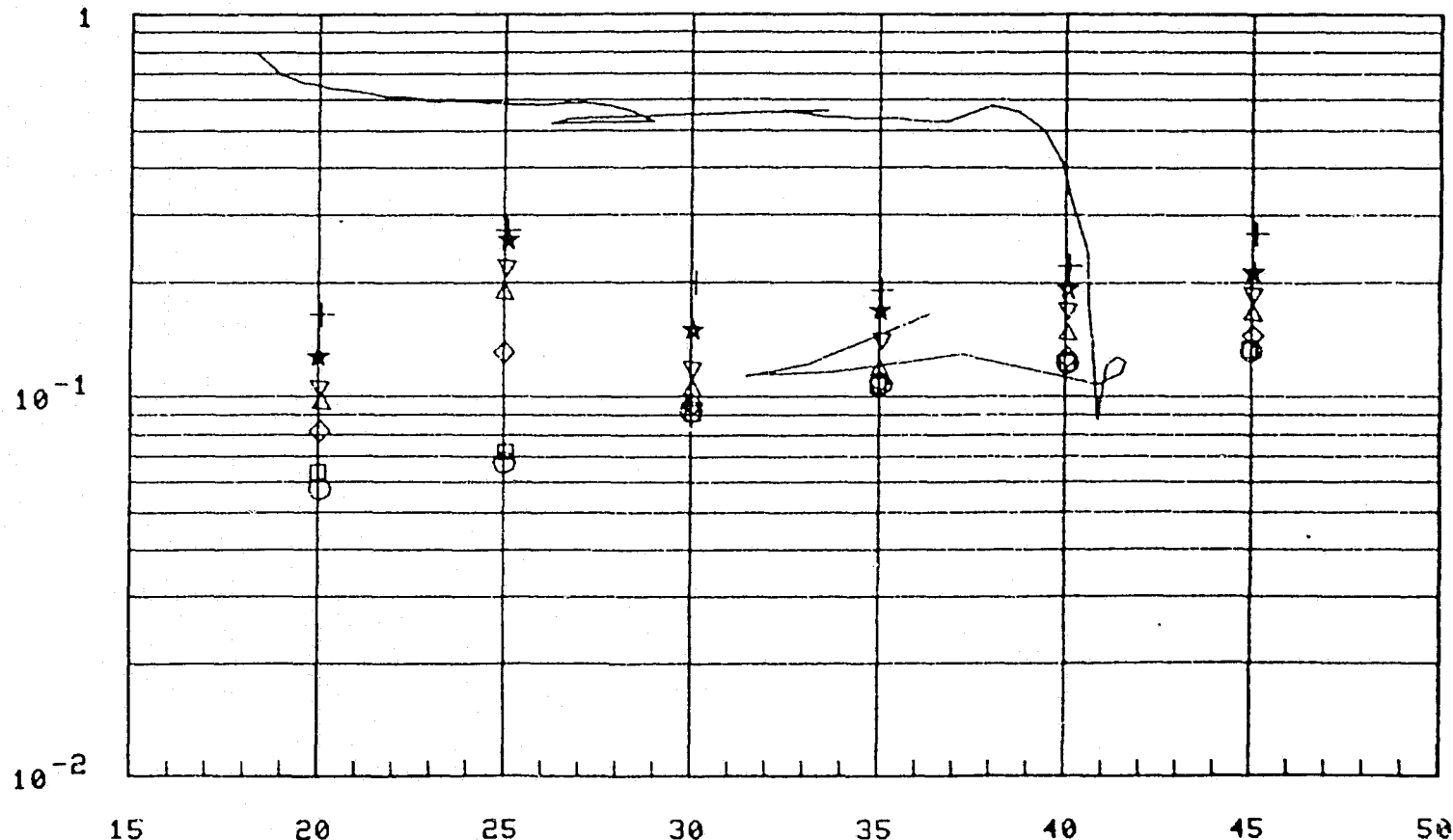
STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.61

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OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9711A/H-REF 965-1300 SEC

LINE QUALITY - FINE



ANGLE-OF-ATTACK - DEG

BASE TIME * 16040423.000 SEC.

ORIGINAL PART 13
OF POOR QUALITY

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.61

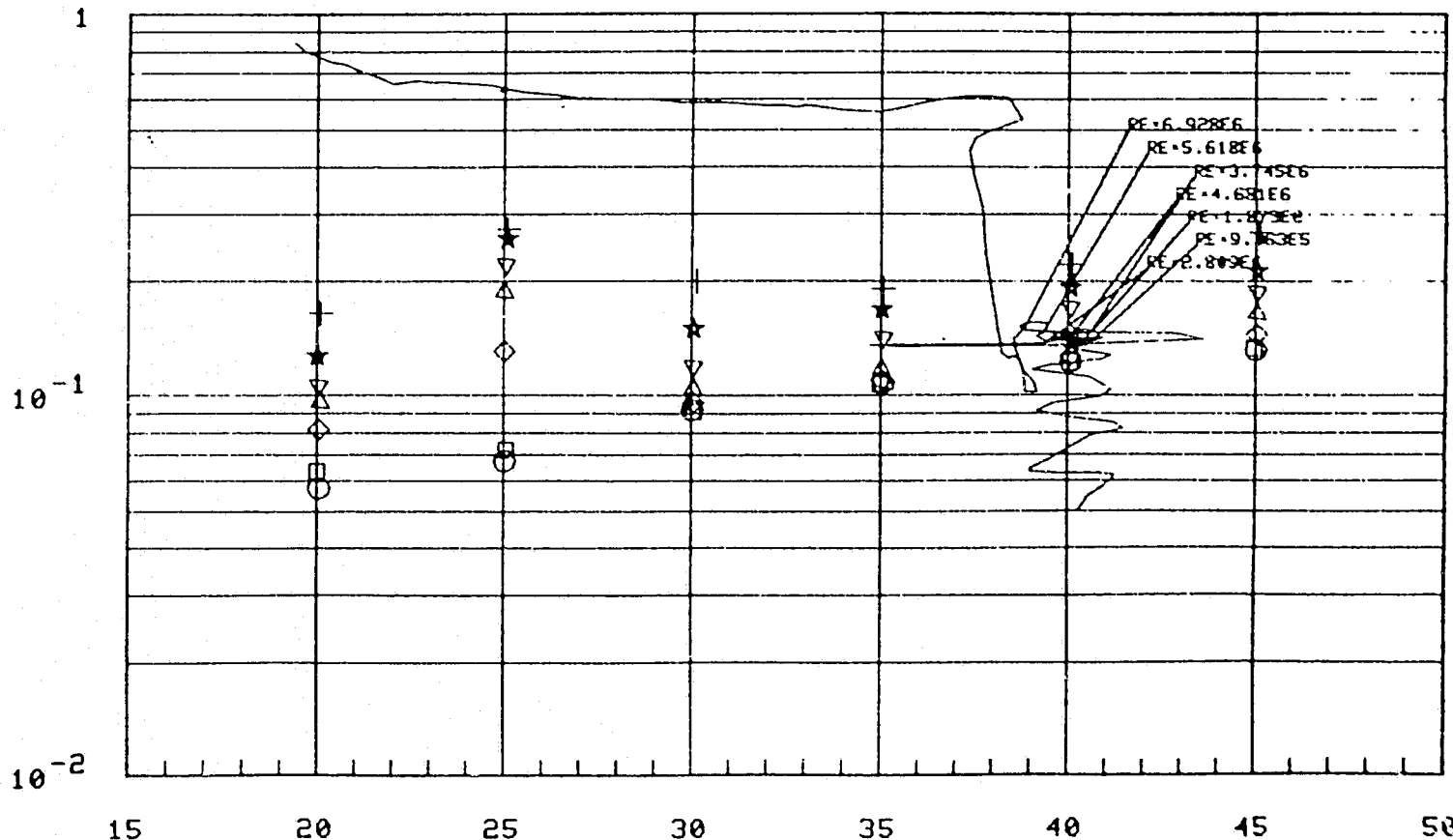
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+

OH39 0.0175 SCALE RE * 0.5 E06
OH39 0.0175 SCALE RE * 1.0 E06
OH39 0.0175 SCALE RE * 1.5 E06
OH39 0.0175 SCALE RE * 2.0 E06
OH39 0.0175 SCALE RE * 2.5 E06
OH39 0.0175 SCALE RE * 3.0 E06
OH39 0.0175 SCALE RE * 3.7 E06

U07T9711A/H-REF 150-1350 SEC

FILE COUNTE - H/H-REF

B-365



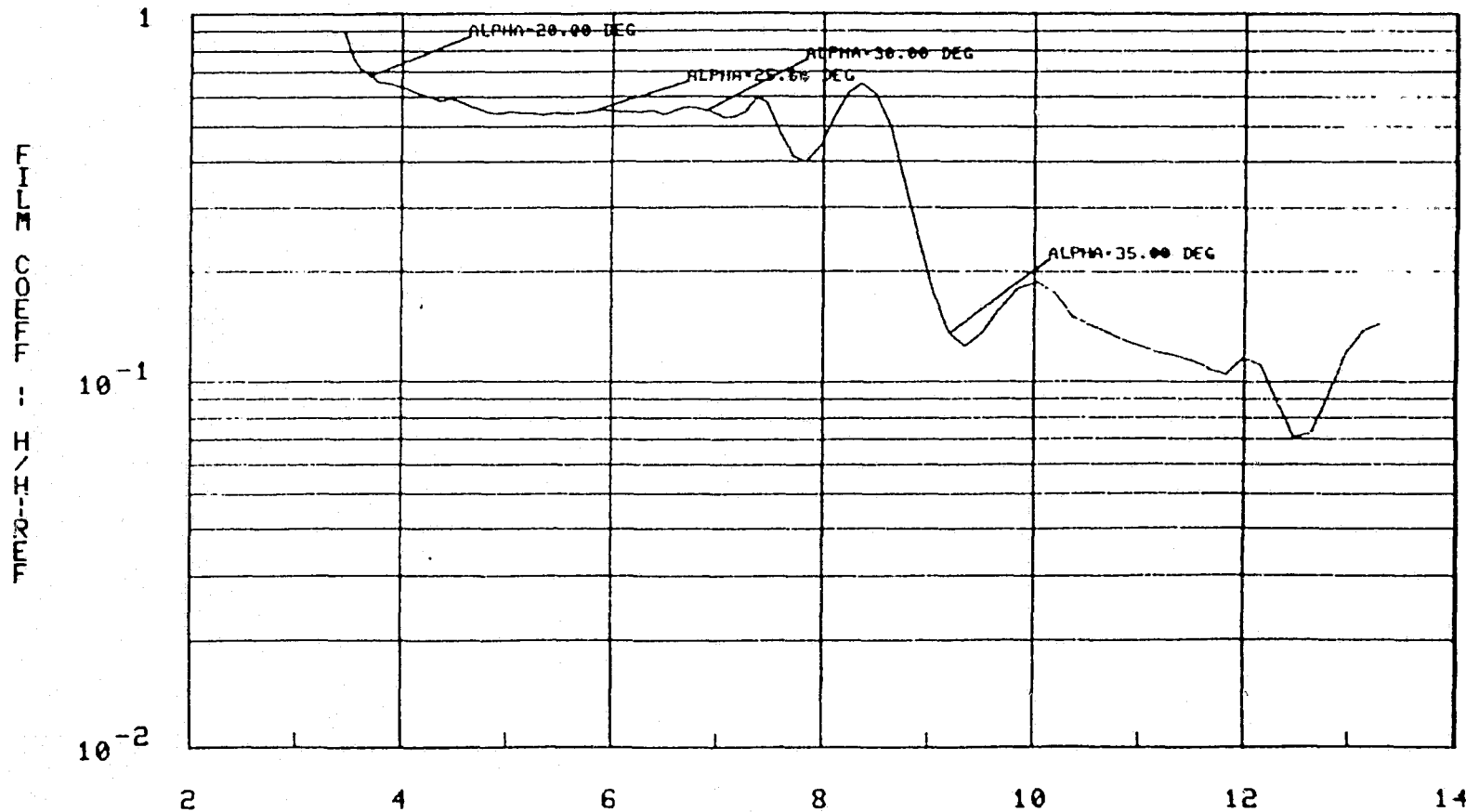
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ANGLE-OF-ATTACK - DEG

#5 #3 S3
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STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.61$

U07T9711A/H-REF 1065-1460 SEC



B-366

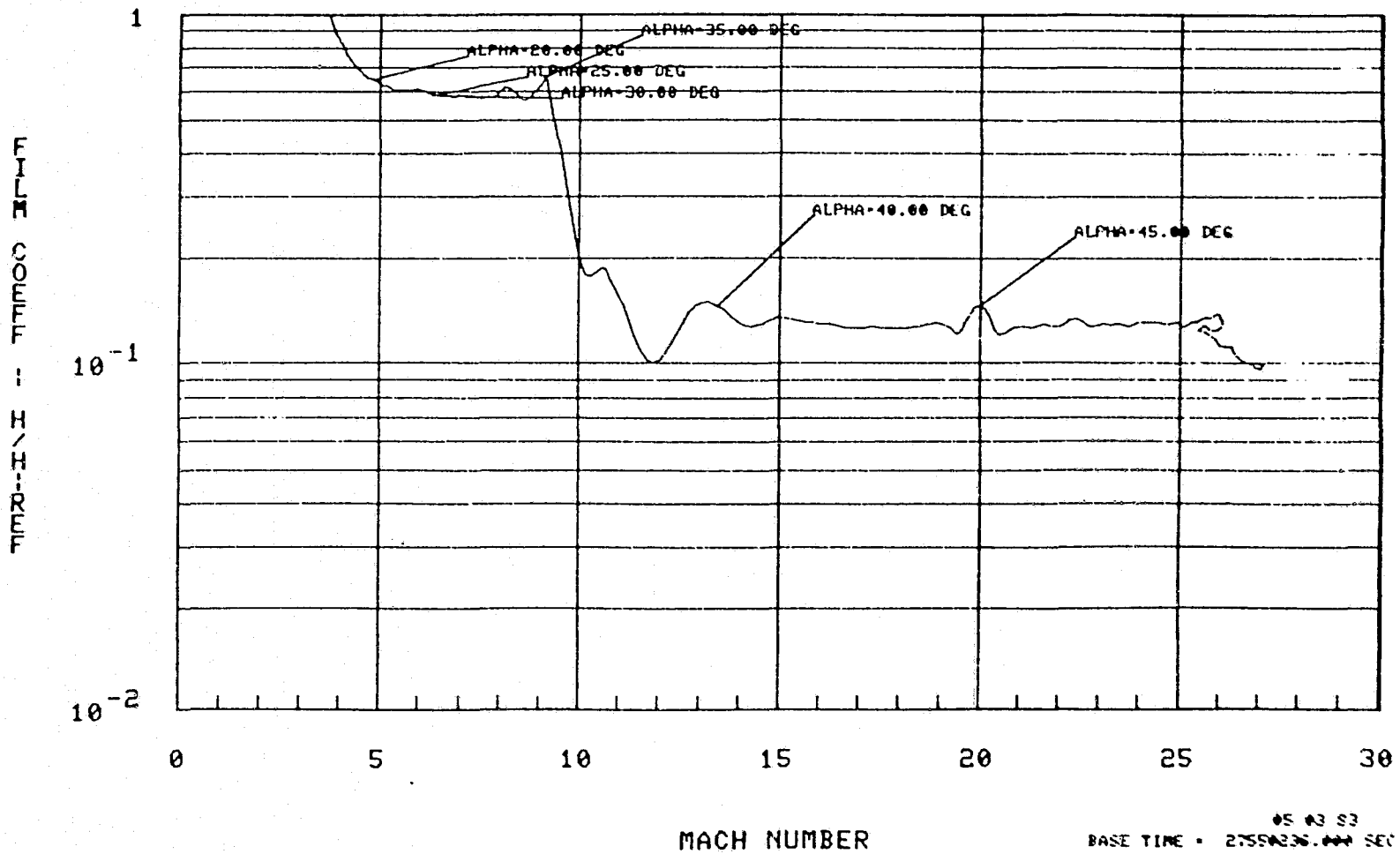
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MACH NUMBER

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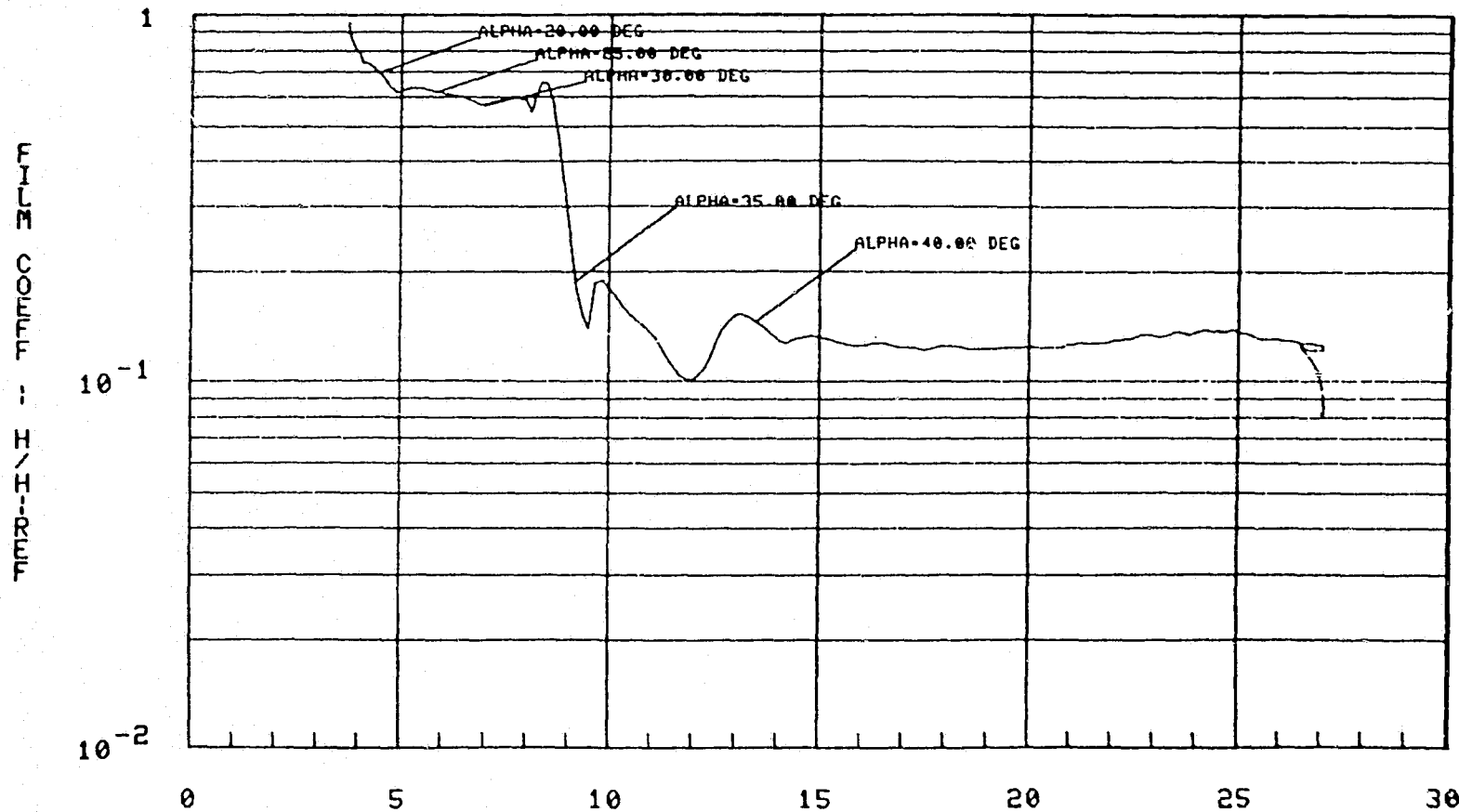
U07T9711A/H-REF 200-1480 SEC



B-367

STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.61$

U07T9711A/H-REF 200-1380 SEC



B-368

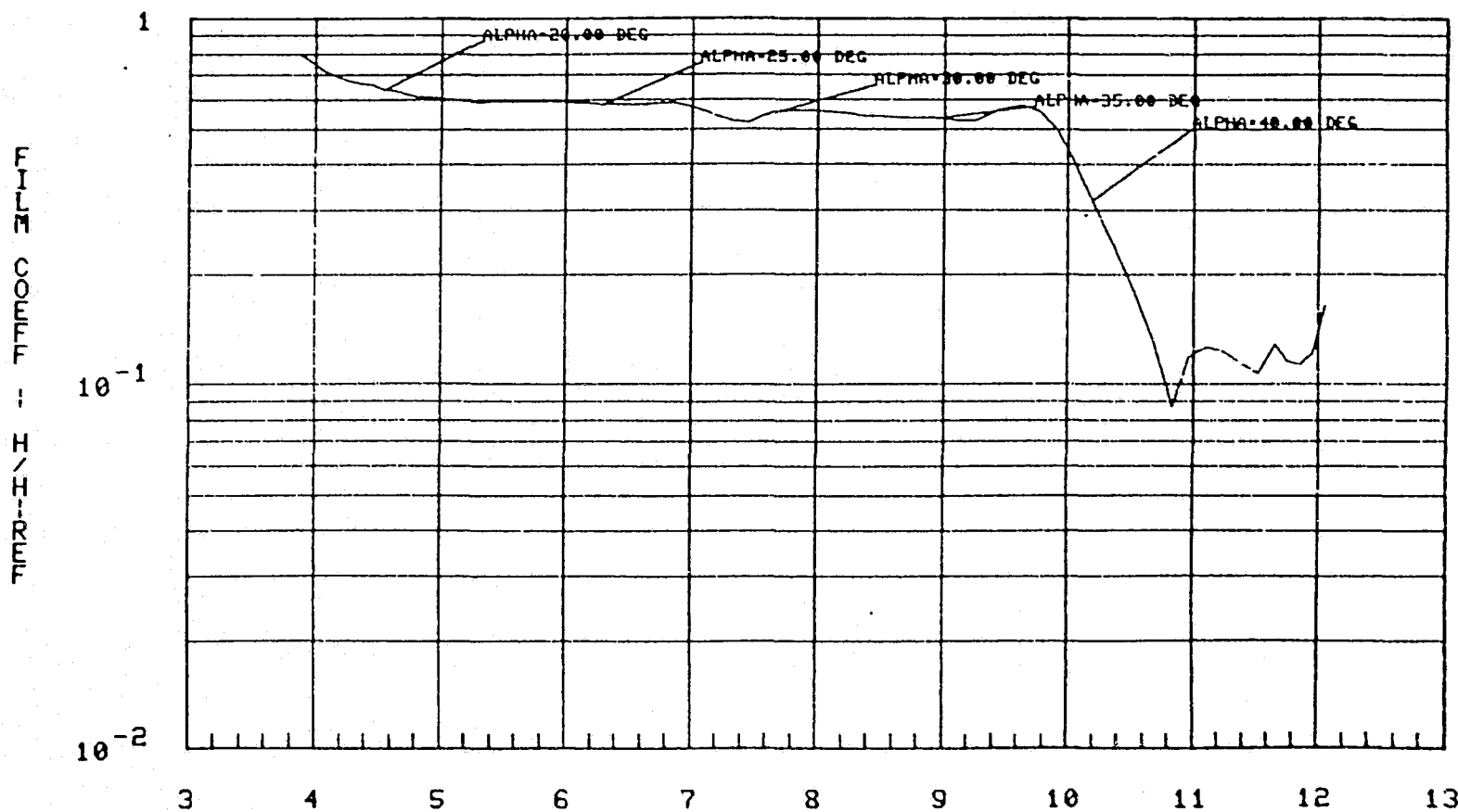
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U07T9711A/H-REF 965-1300 SEC



ORIGINAL PAGE IS
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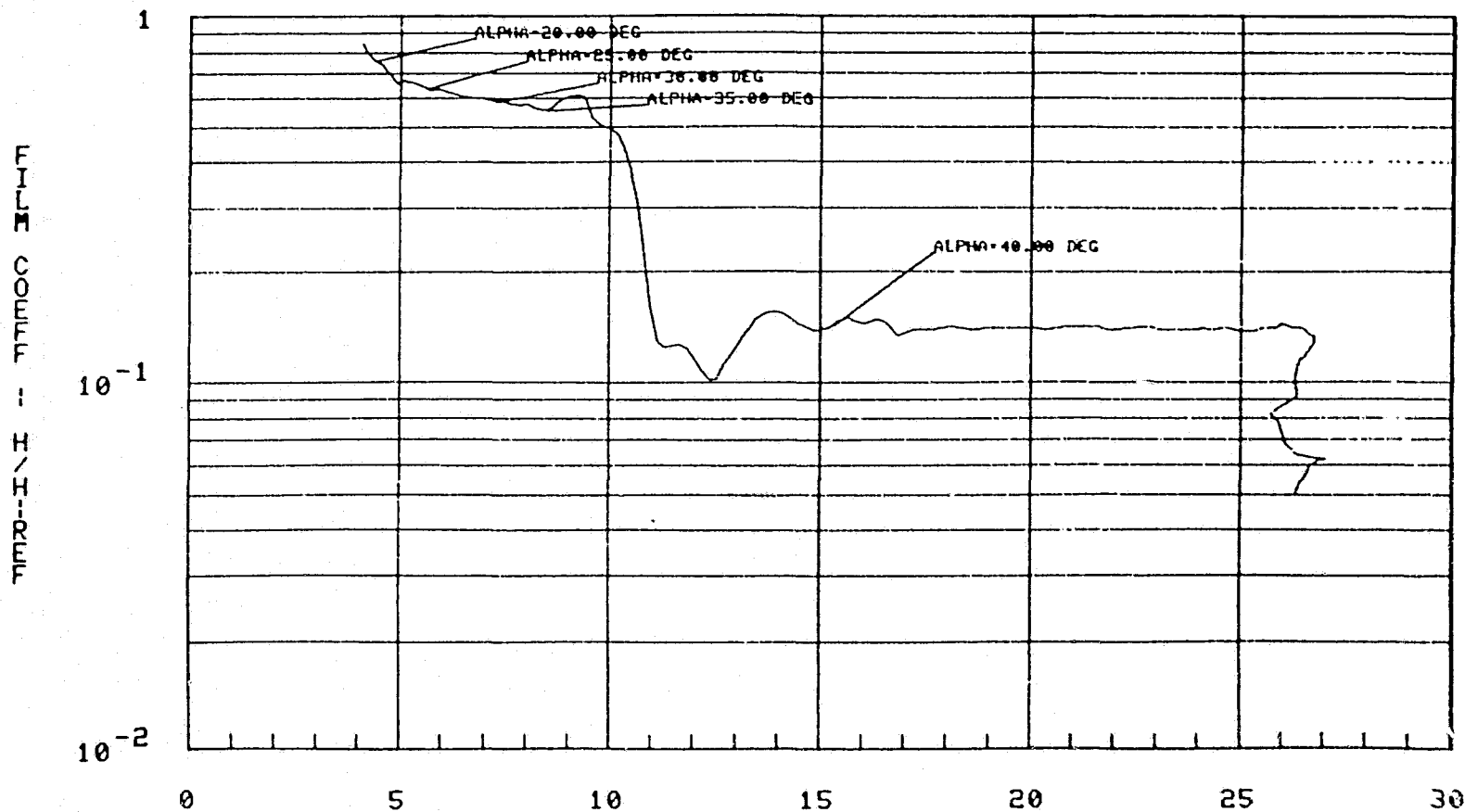
B-369

MACH NUMBER

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BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.61$

U07T9711A/H-REF 150-1350 SEC



ORIGINAL PAGE
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B-370

05 03 S3
BASE TIME = 27000001.000 SEC.

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.61

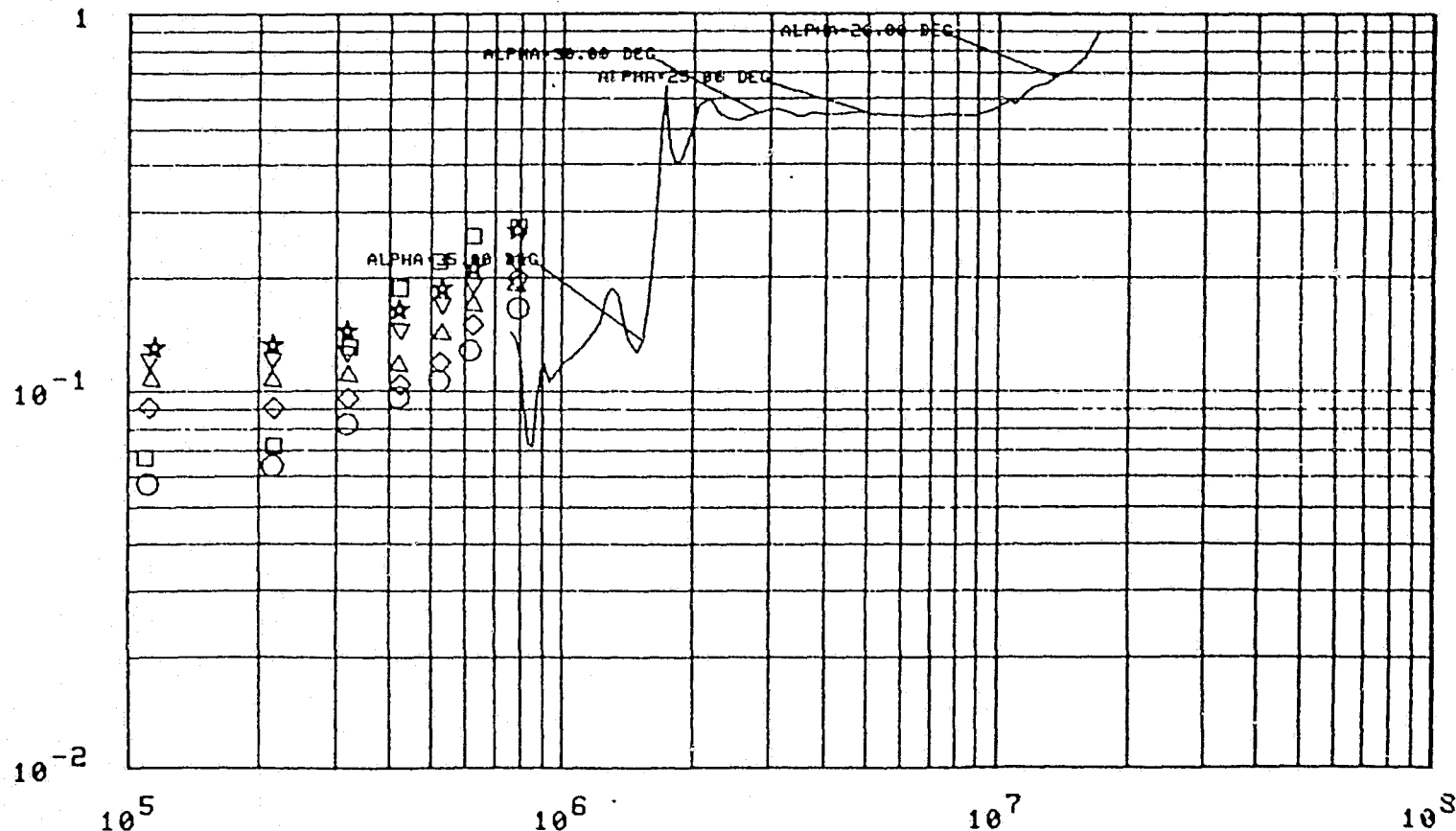
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OH39 ALPHA = 20 DEGREES
OH39 ALPHA = 25 DEGREES
OH39 ALPHA = 30 DEGREES
OH39 ALPHA = 35 DEGREES
OH39 ALPHA = 40 DEGREES
OH39 ALPHA = 45 DEGREES

U07T9711A/H-REF 1065-1460 SEC

TIME COULDN'T BE PRINTED

B-371



REYNOLDS NUMBER (NS)

BASE TIME = 09049744.000 SEC.

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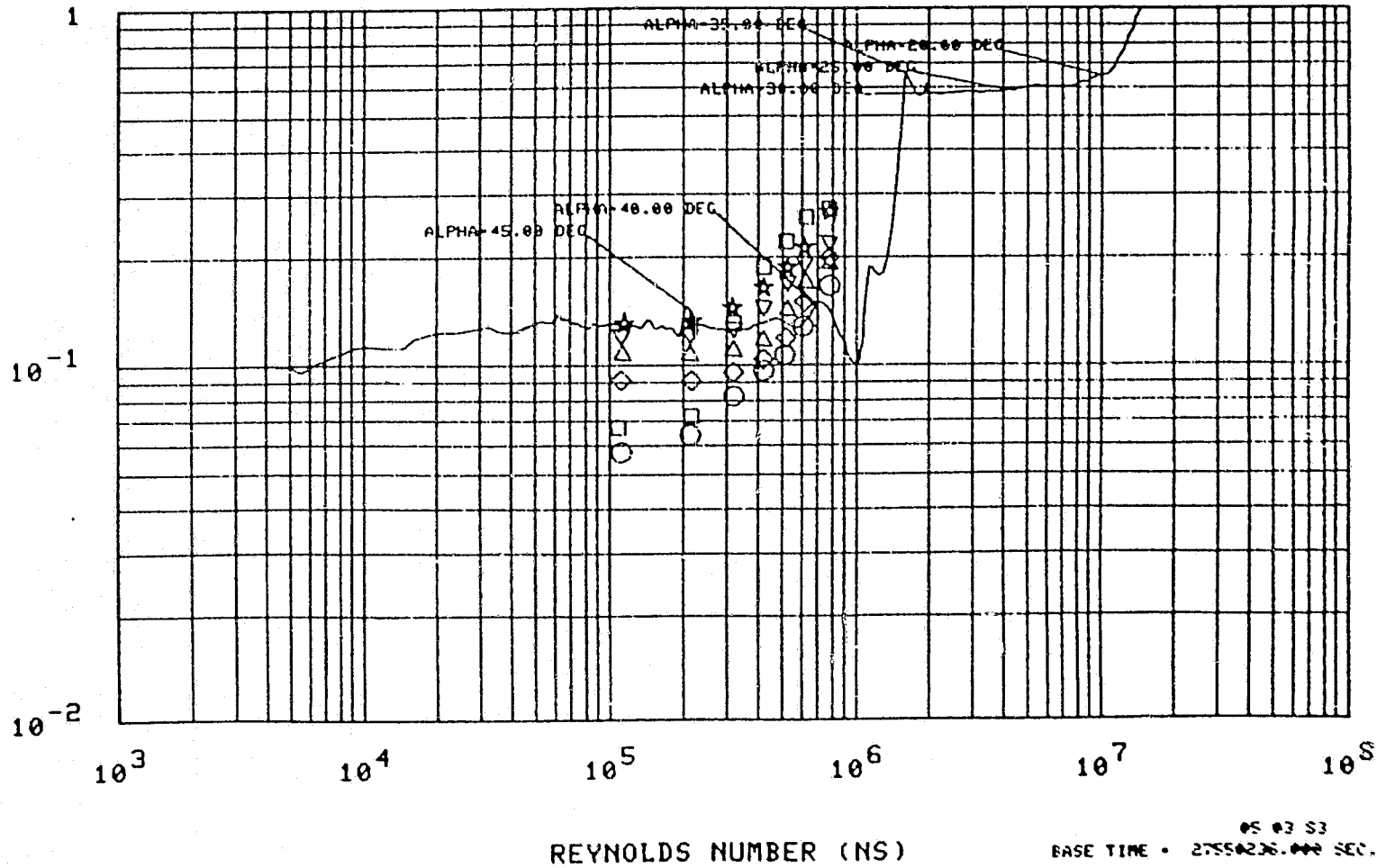
STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.61

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OH39 ALPHA * 20 DEGREES
OH39 ALPHA * 25 DEGREES
OH39 ALPHA * 30 DEGREES
OH39 ALPHA * 35 DEGREES
OH39 ALPHA * 40 DEGREES
OH39 ALPHA * 45 DEGREES

U07T9711A/H-REF 200-1480 SEC

LINE CODES -- I/I--RUL



ORIGINAL PAGE IS
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B-372

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.61

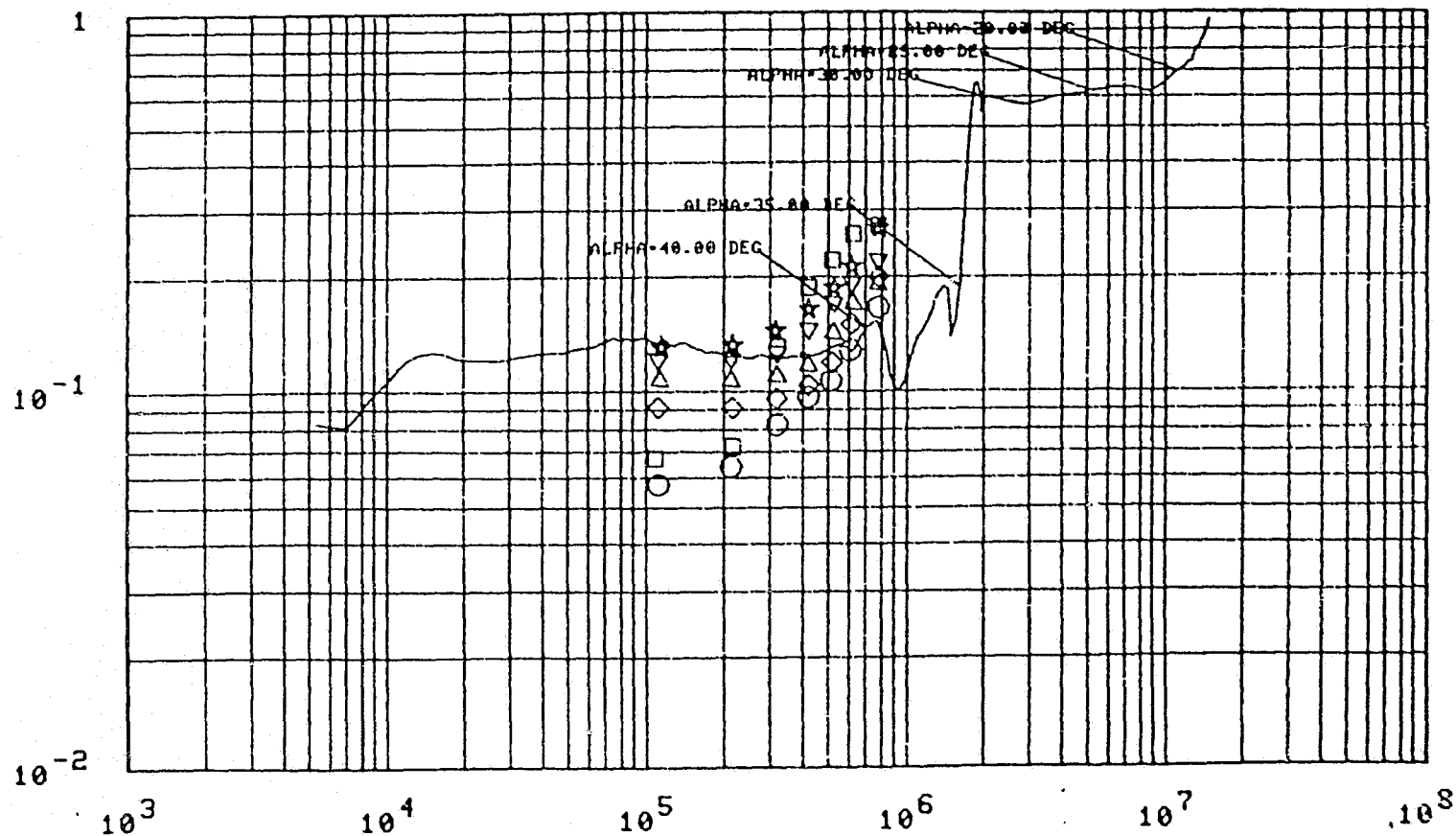
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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9711A/H-REF 200-1380 SEC

FILE CODE: H-I-001

B-373



REYNOLDS NUMBER (NS)

05 03 S3
BASE TIME • 077456S4.000 SEC.

ORIGINAL PAGE IS
OF POOR QUALITY

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.61

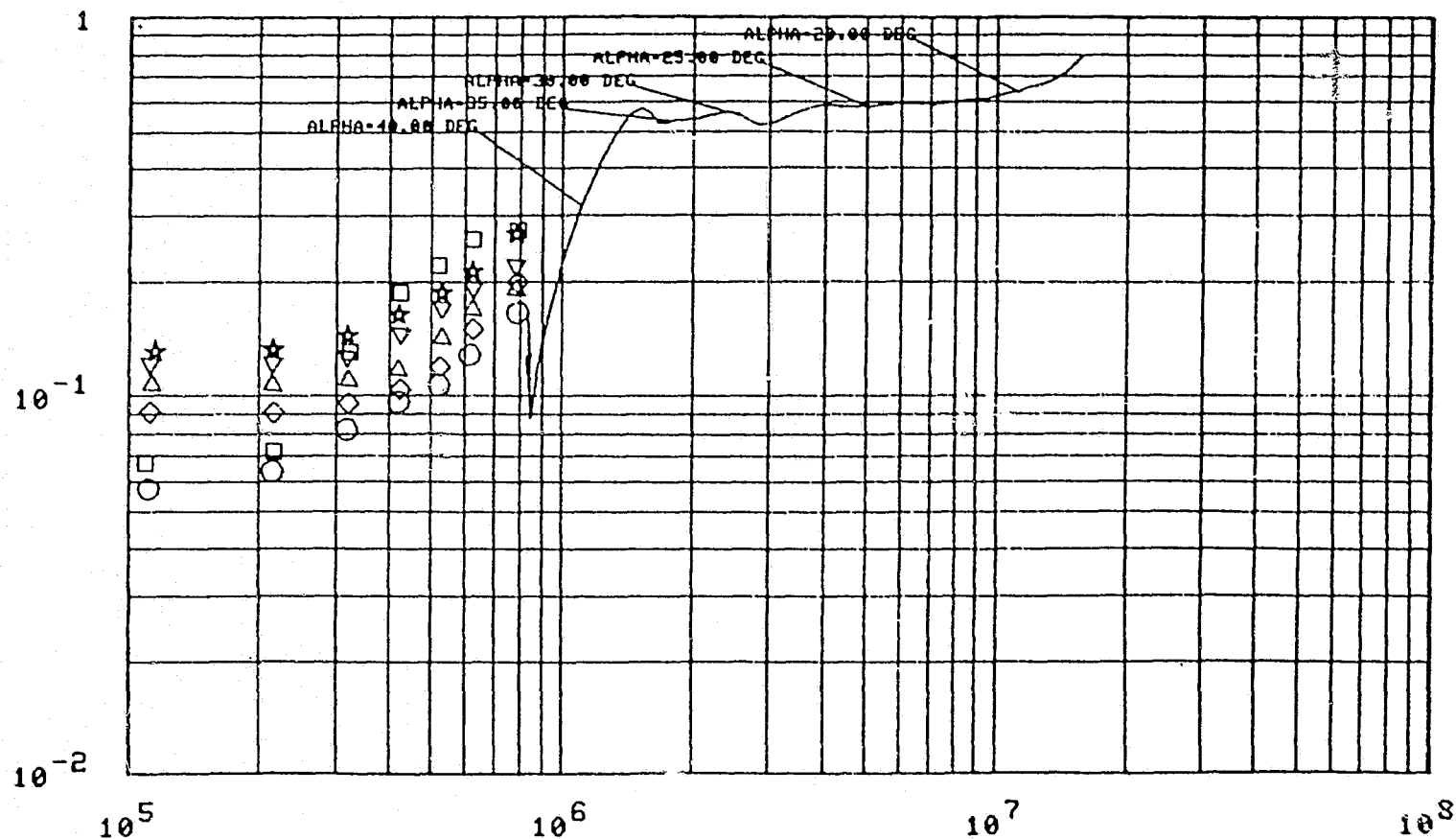
U07T9711A/H-REF 965-1300 SEC

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

FILE CODE: H-H-REUL

B-374



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REYNOLDS NUMBER (NS)

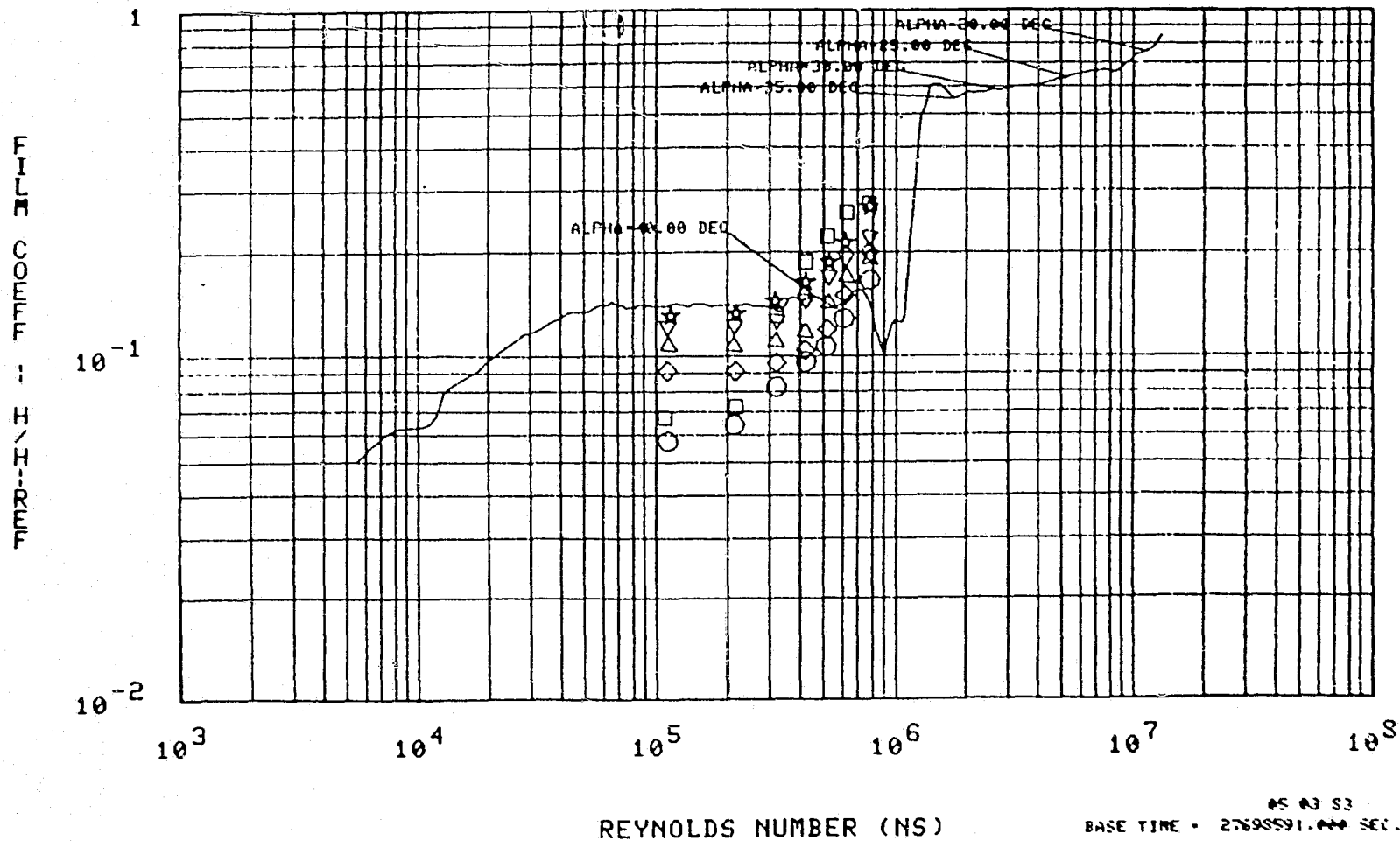
05 03 53
BASE TIME • 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.61

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OH39 ALPHA • 20 DEGREES
OH39 ALPHA • 25 DEGREES
OH39 ALPHA • 30 DEGREES
OH39 ALPHA • 35 DEGREES
OH39 ALPHA • 40 DEGREES
OH39 ALPHA • 45 DEGREES

U07T9711A/H-REF 150-1350 SEC

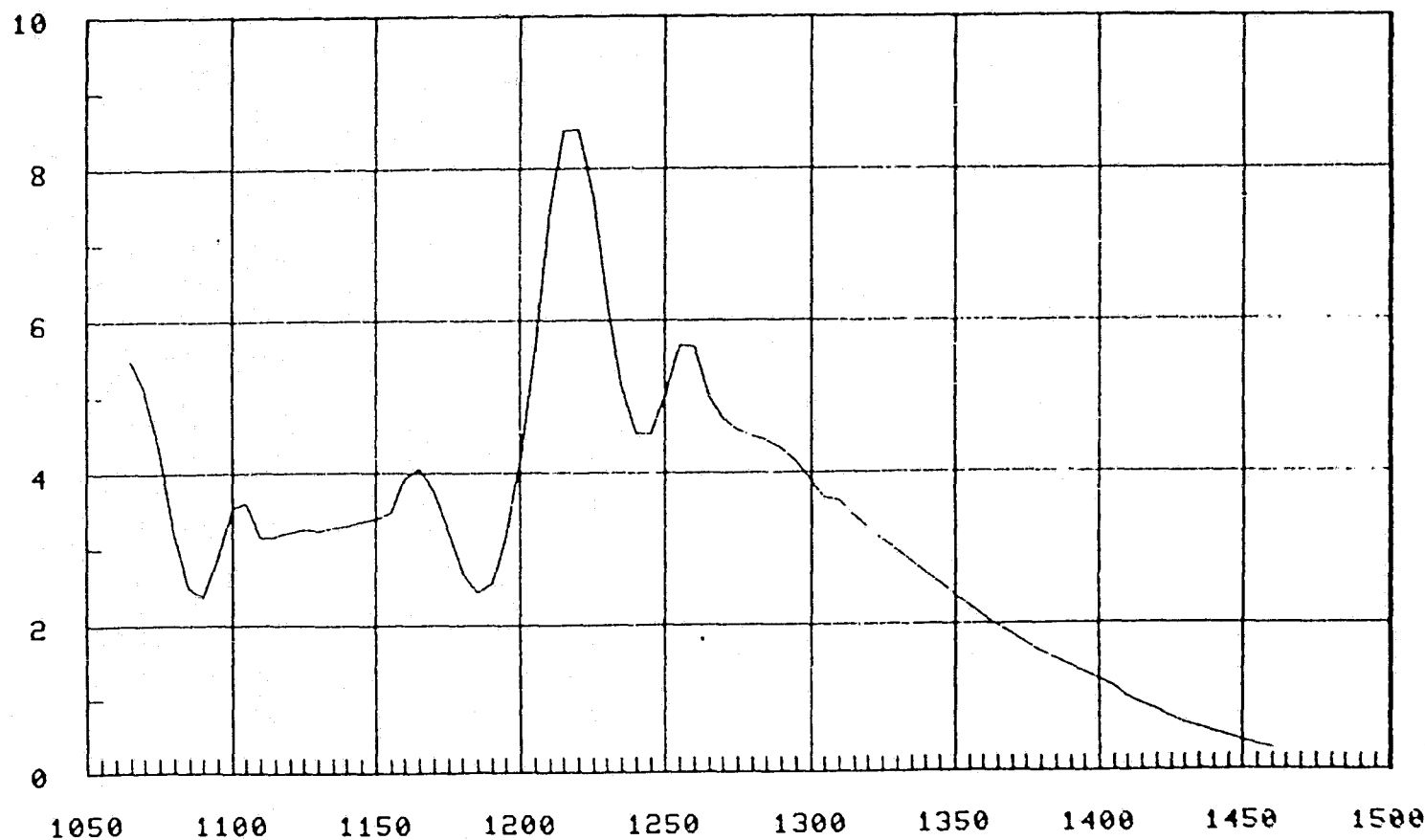


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U87T9711A

FLIGHTING RATE -- BUILDING -- SEC



TIME - SECONDS

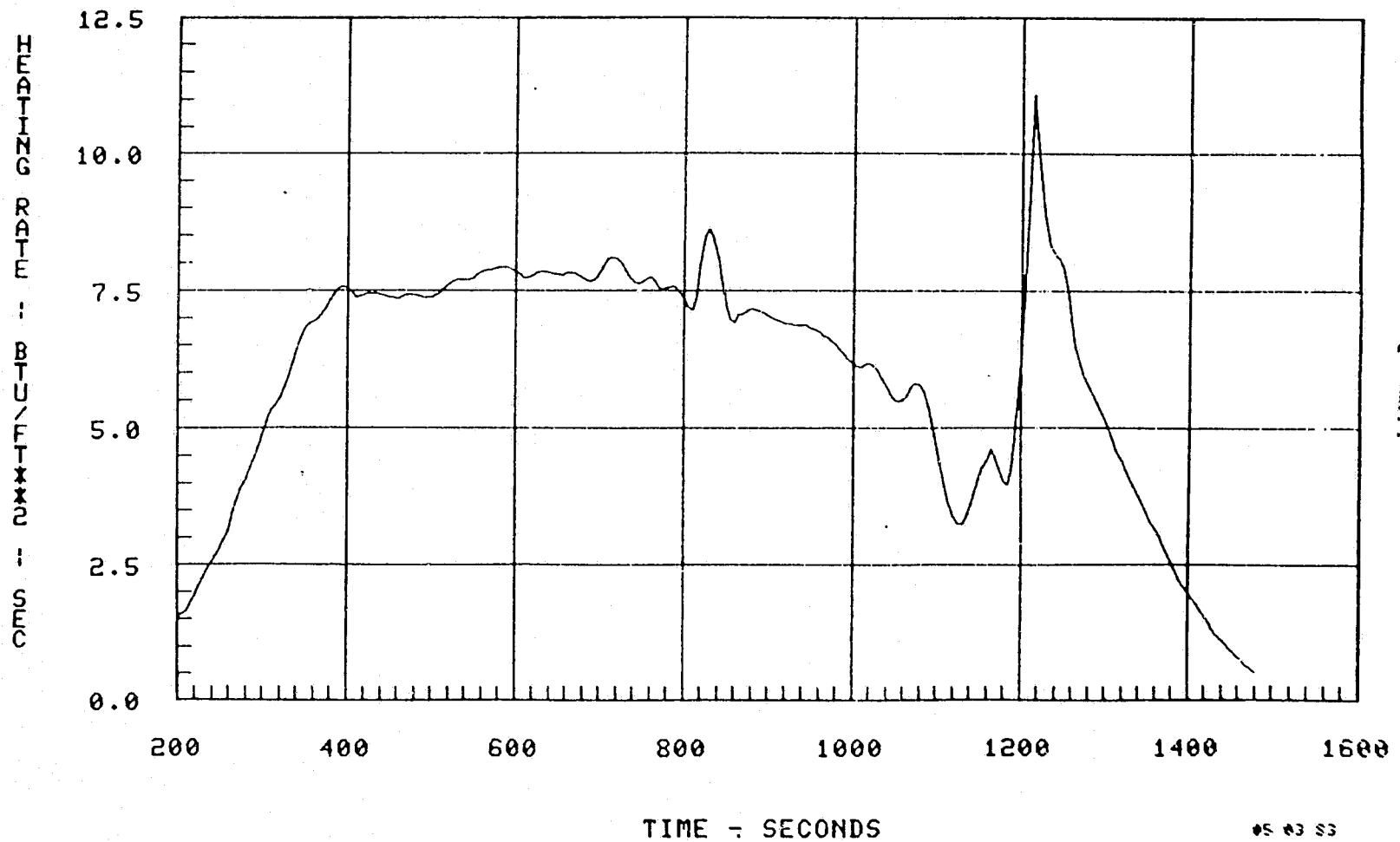
45 43 S3

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B-376

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.61$

U07T9711A



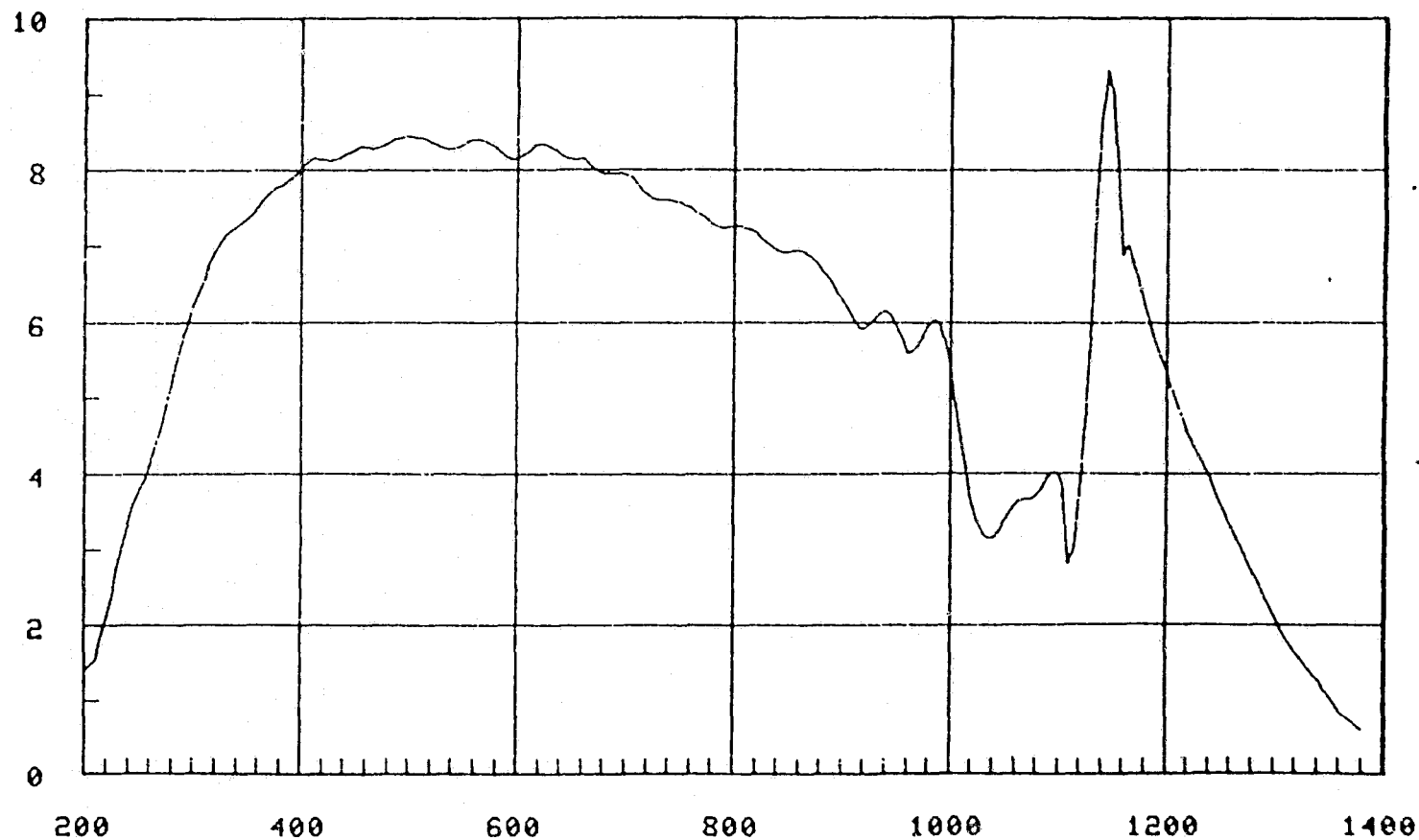
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B-377

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.61

U87T9711A

HEATING RATE - BTU/FT*HR - SEC



TIME - SECONDS

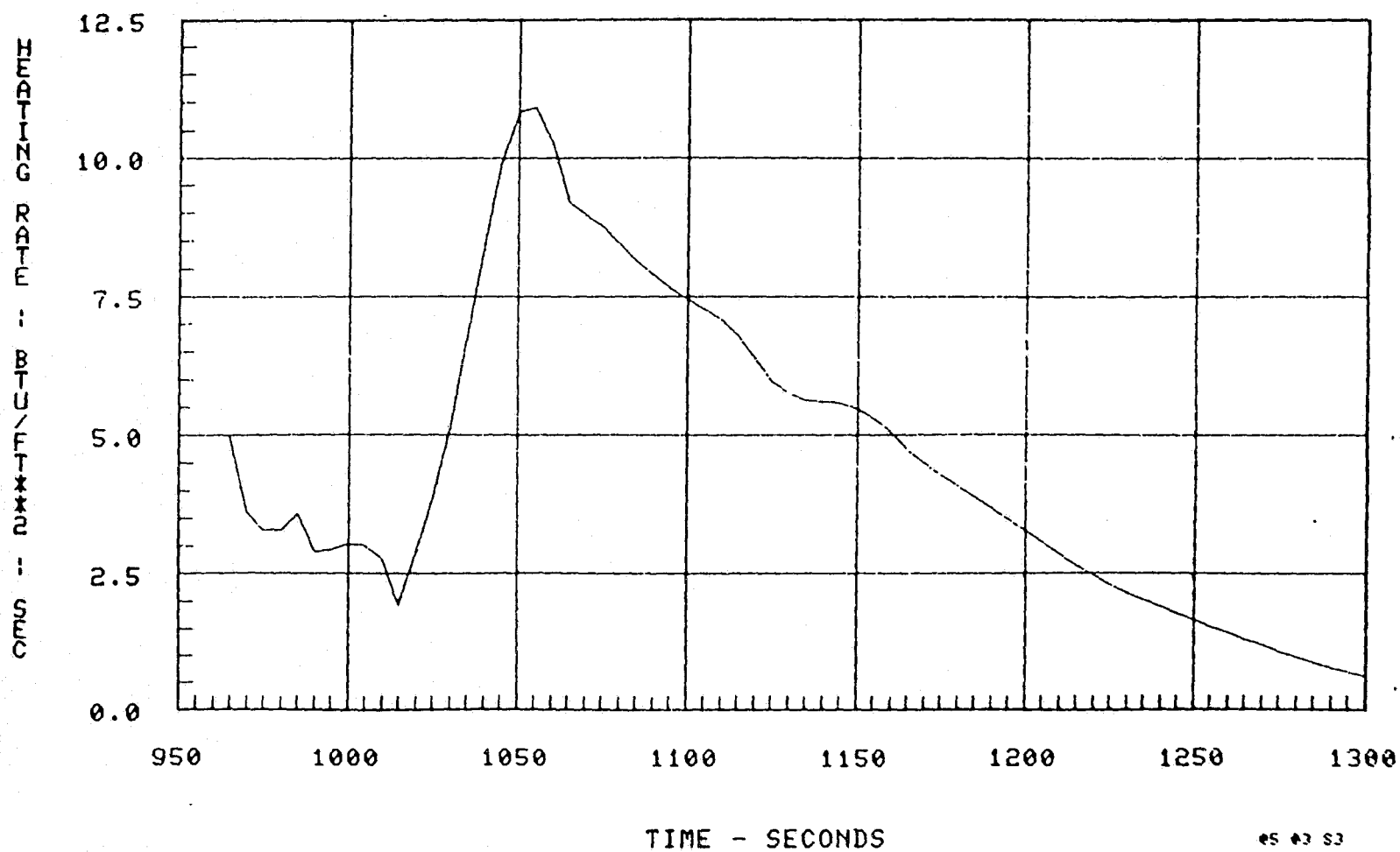
05 43 S3

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B-378

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.61

U07T9711A



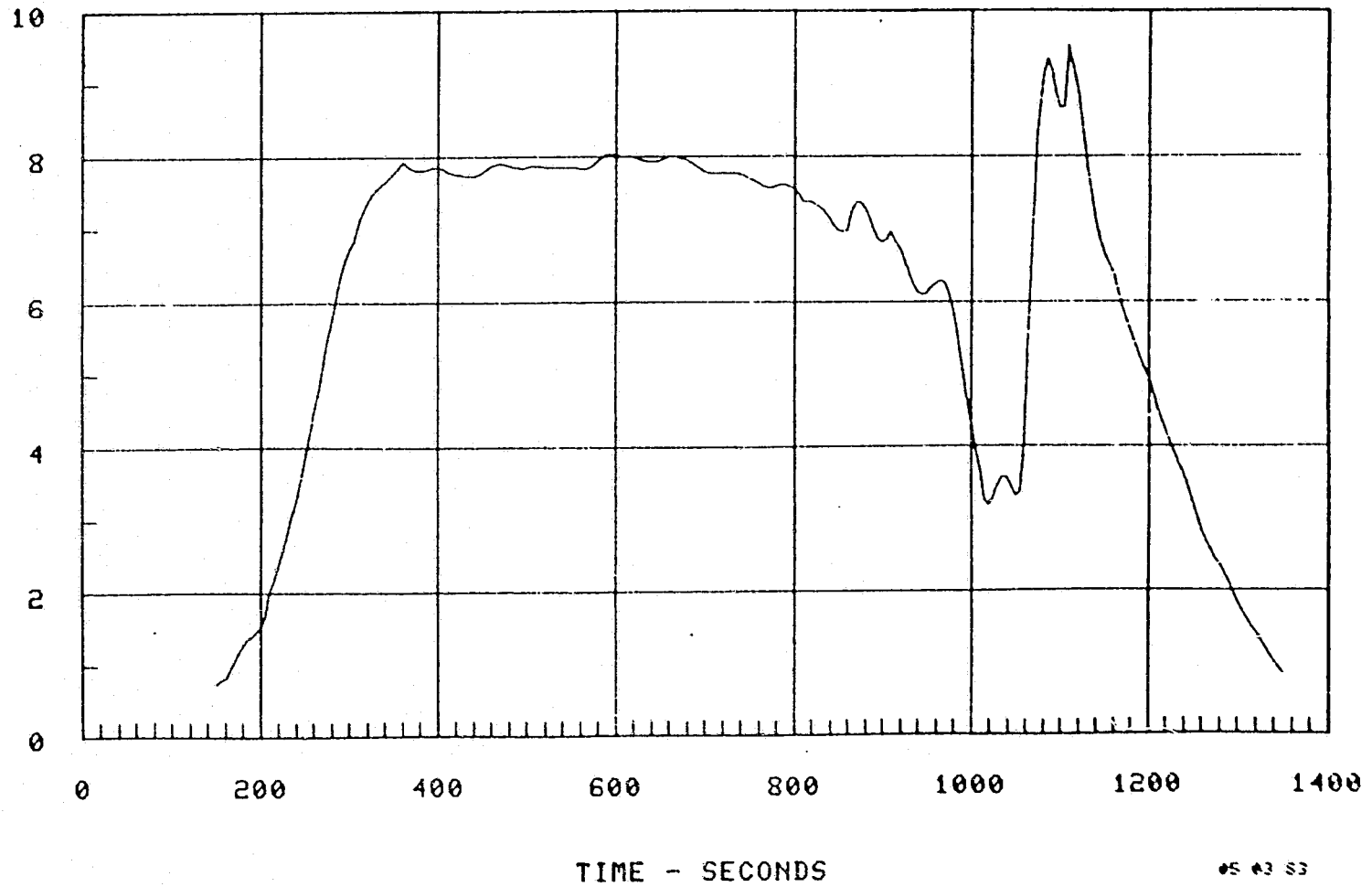
B-379

45 43 S3

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.61$

U07T9711A

HEATING RATE - BULB - SEC



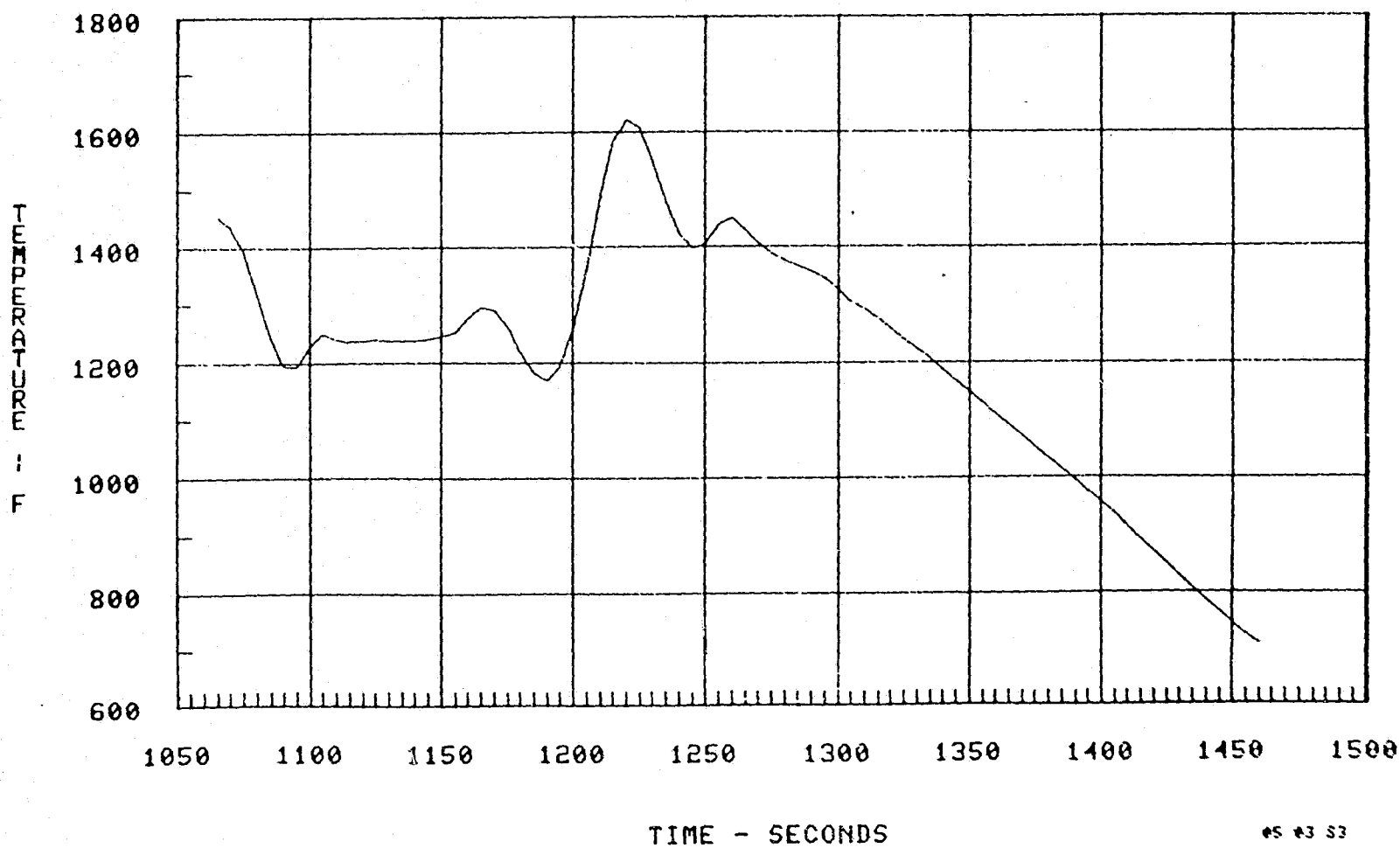
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B-380

05 43 53

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.61

U07T9711A



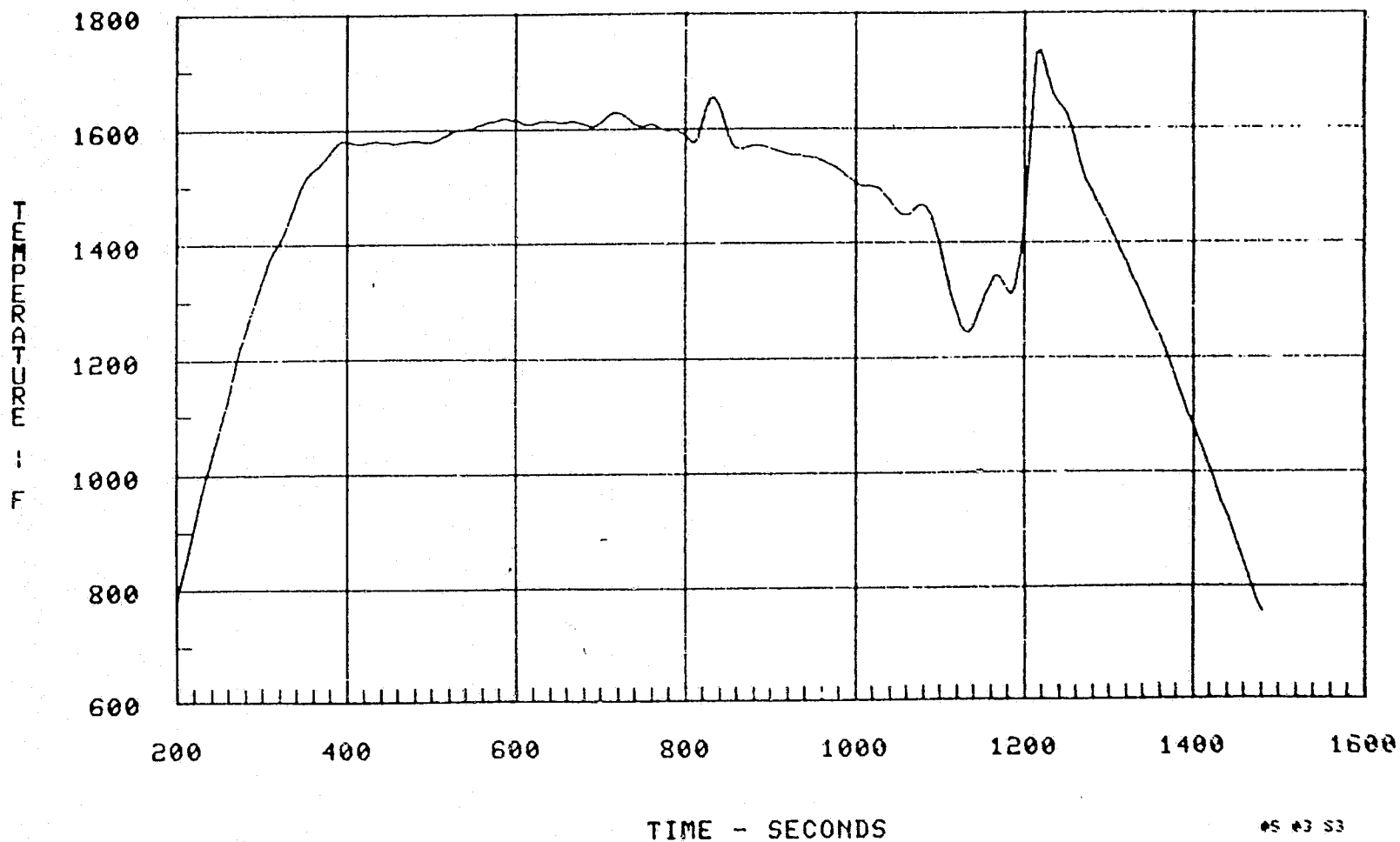
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B-381

45 43 33

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.61

U87T9711A



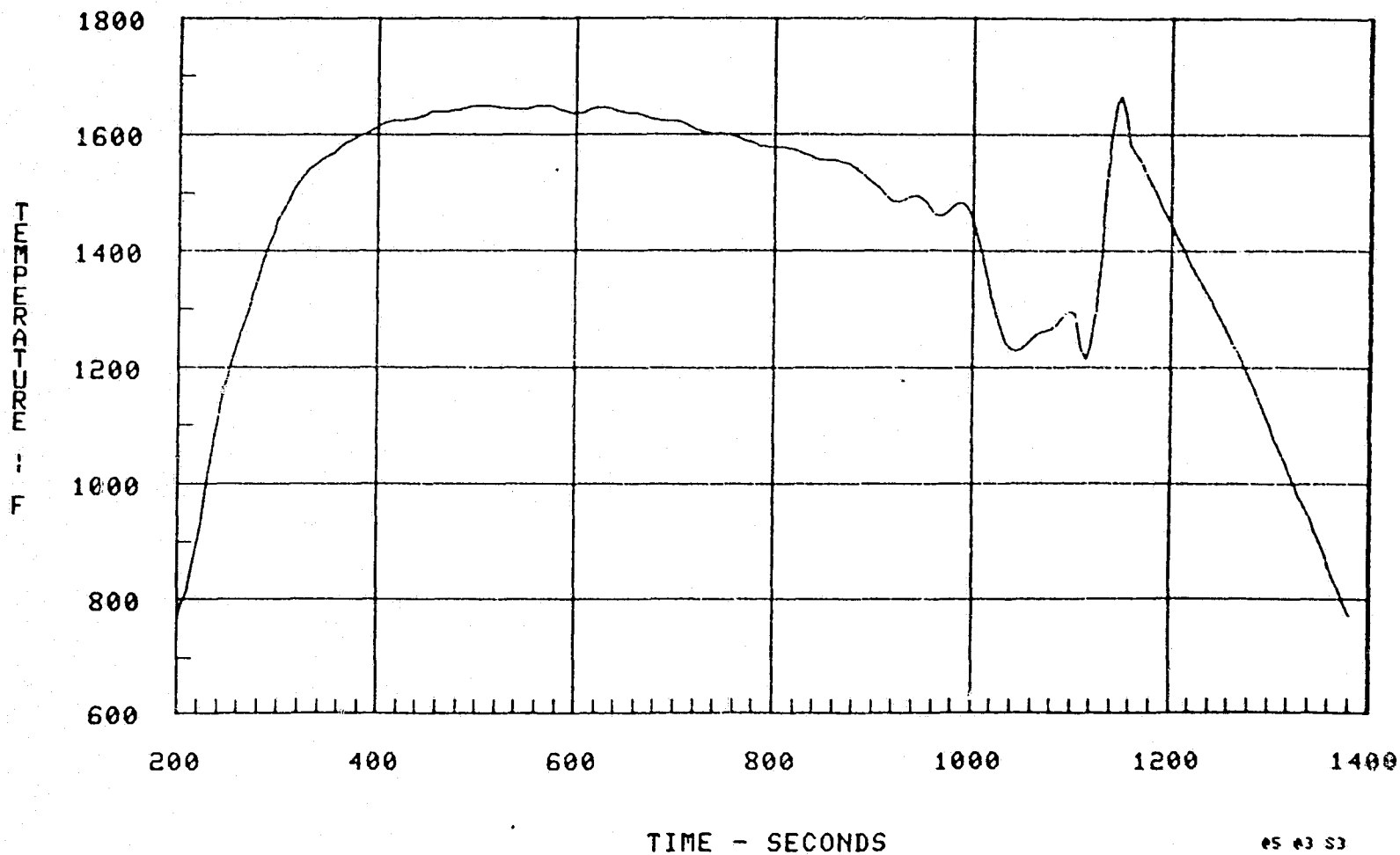
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B-382

#S #3 S3

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.61

U0719711A

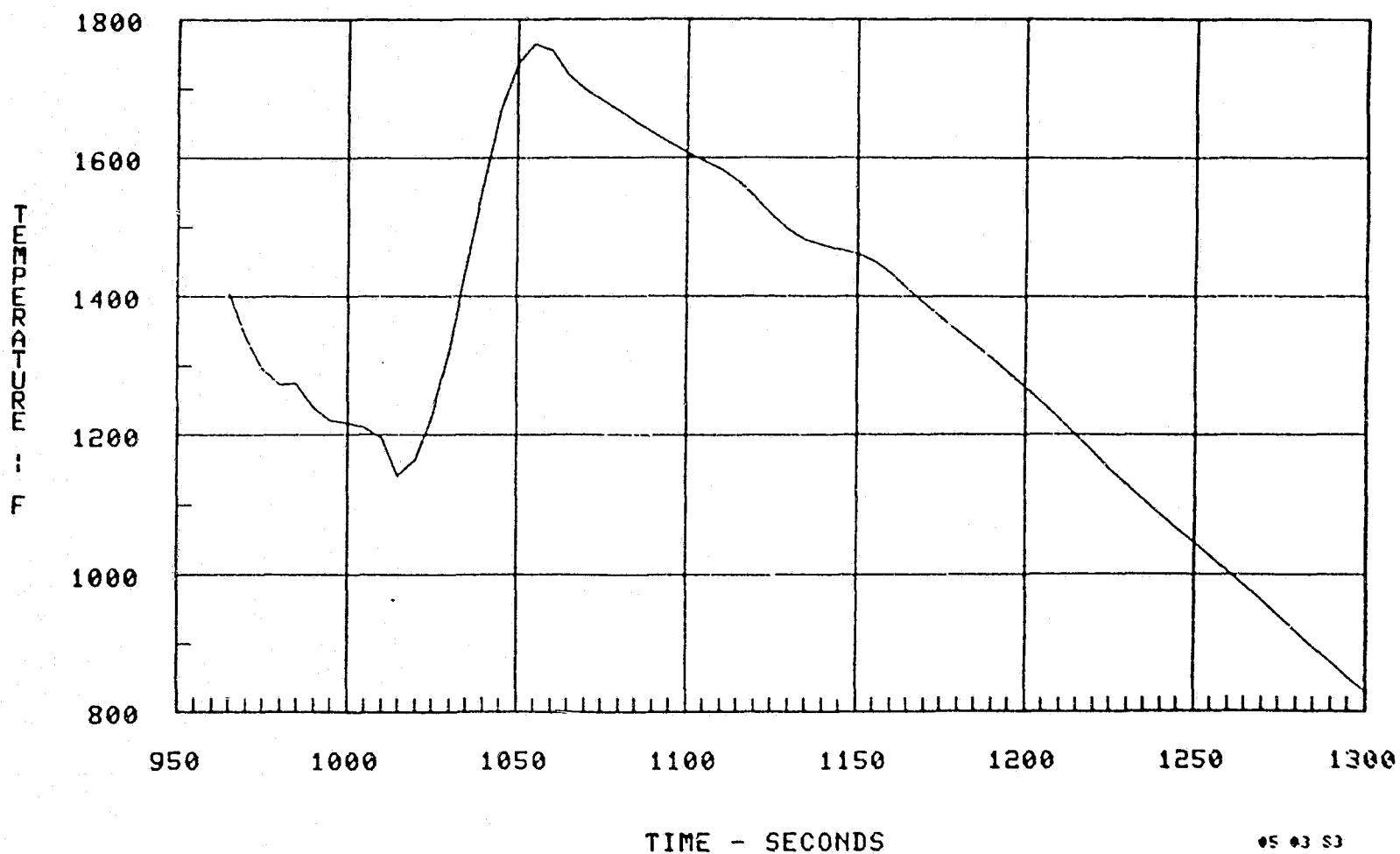


B-383

ORIGINAL PAGE IS
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STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.61$

U07T9711A



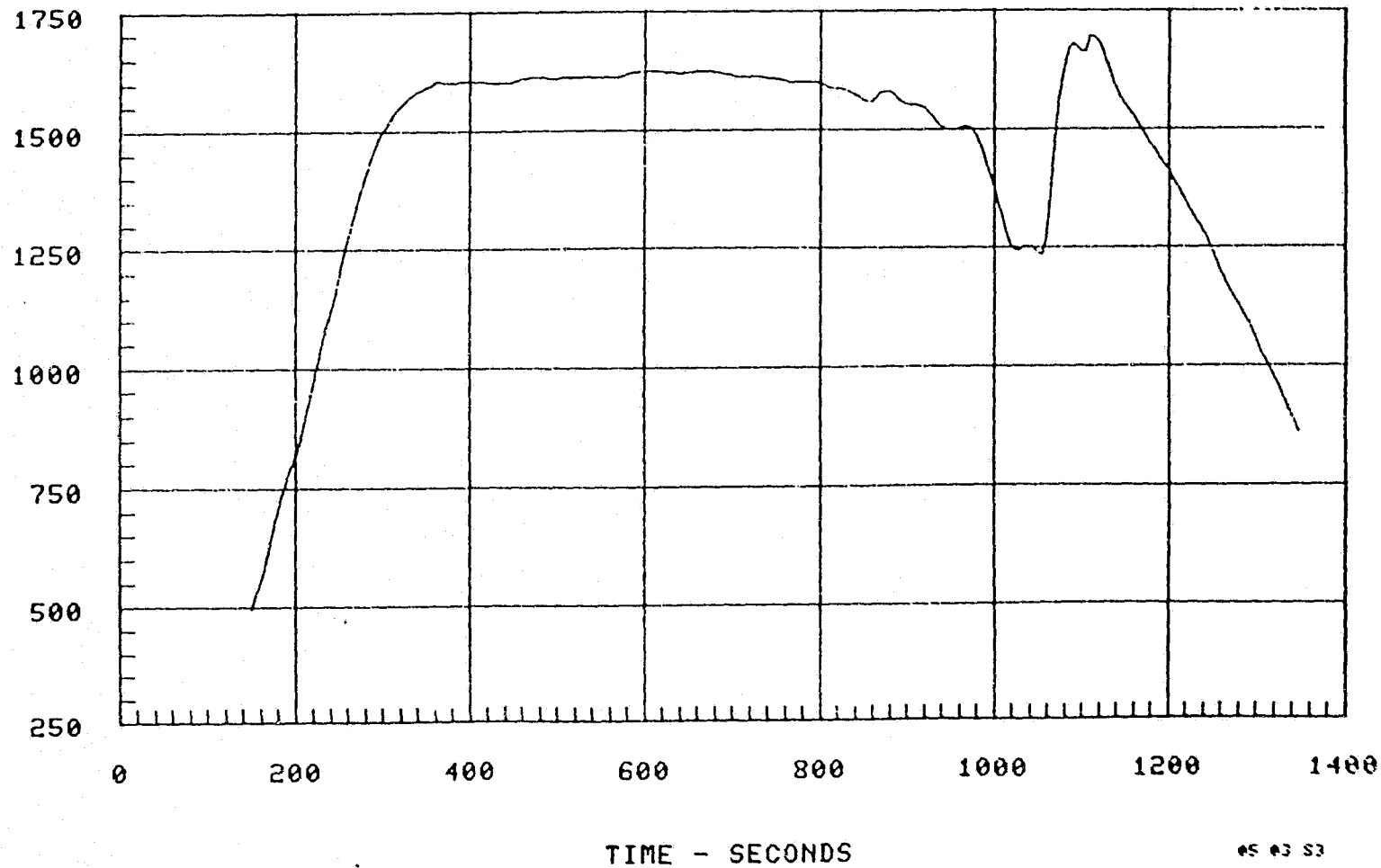
B-384

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.61

U07T9711A

B-385

TEMPERATURE - F



ORIGINAL PLATE OF POOR QUALITY

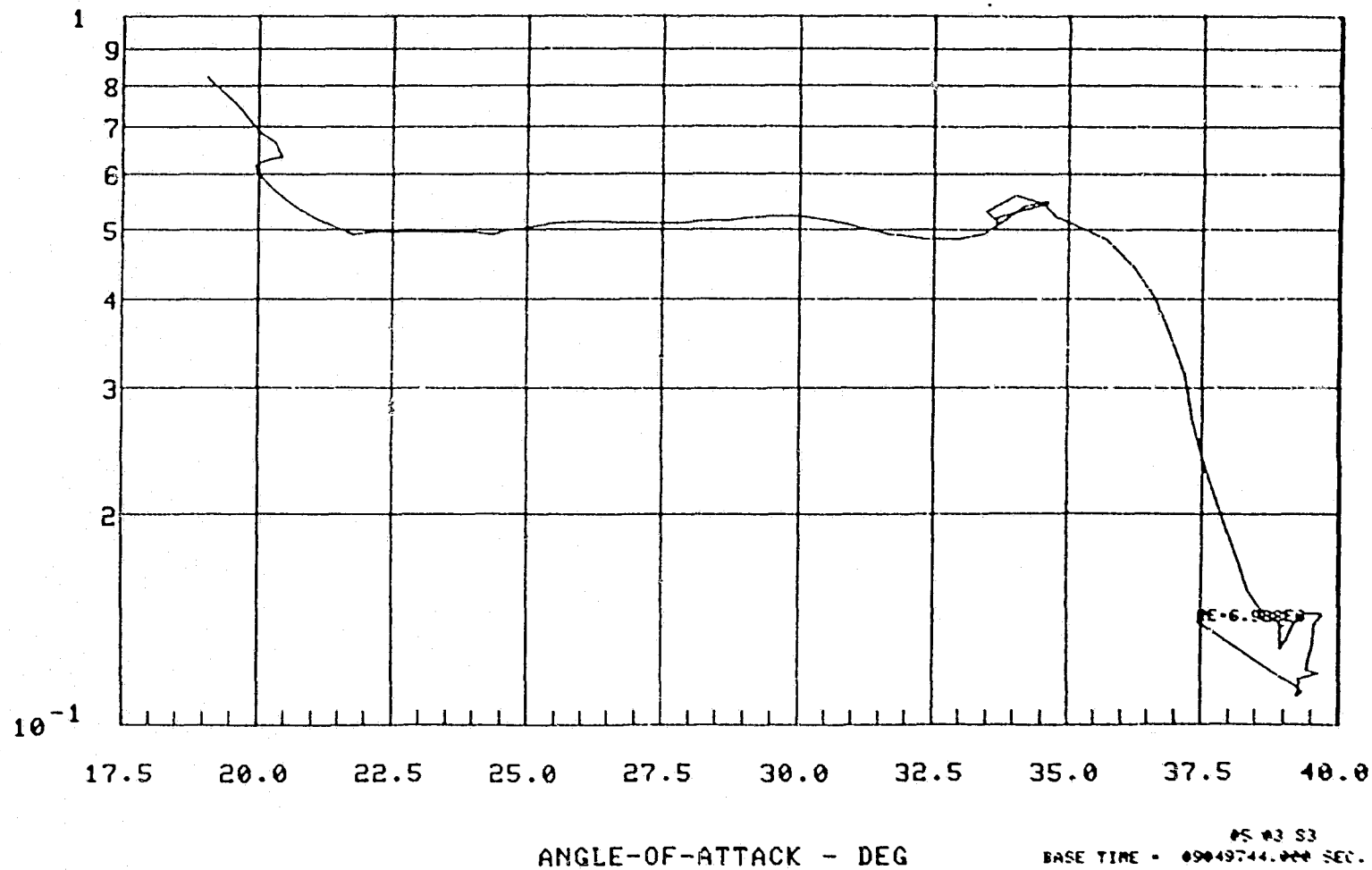
45 43 S3

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A/H-REF 1965-1460 SEC

LIFT COEFFICIENT - H-REF

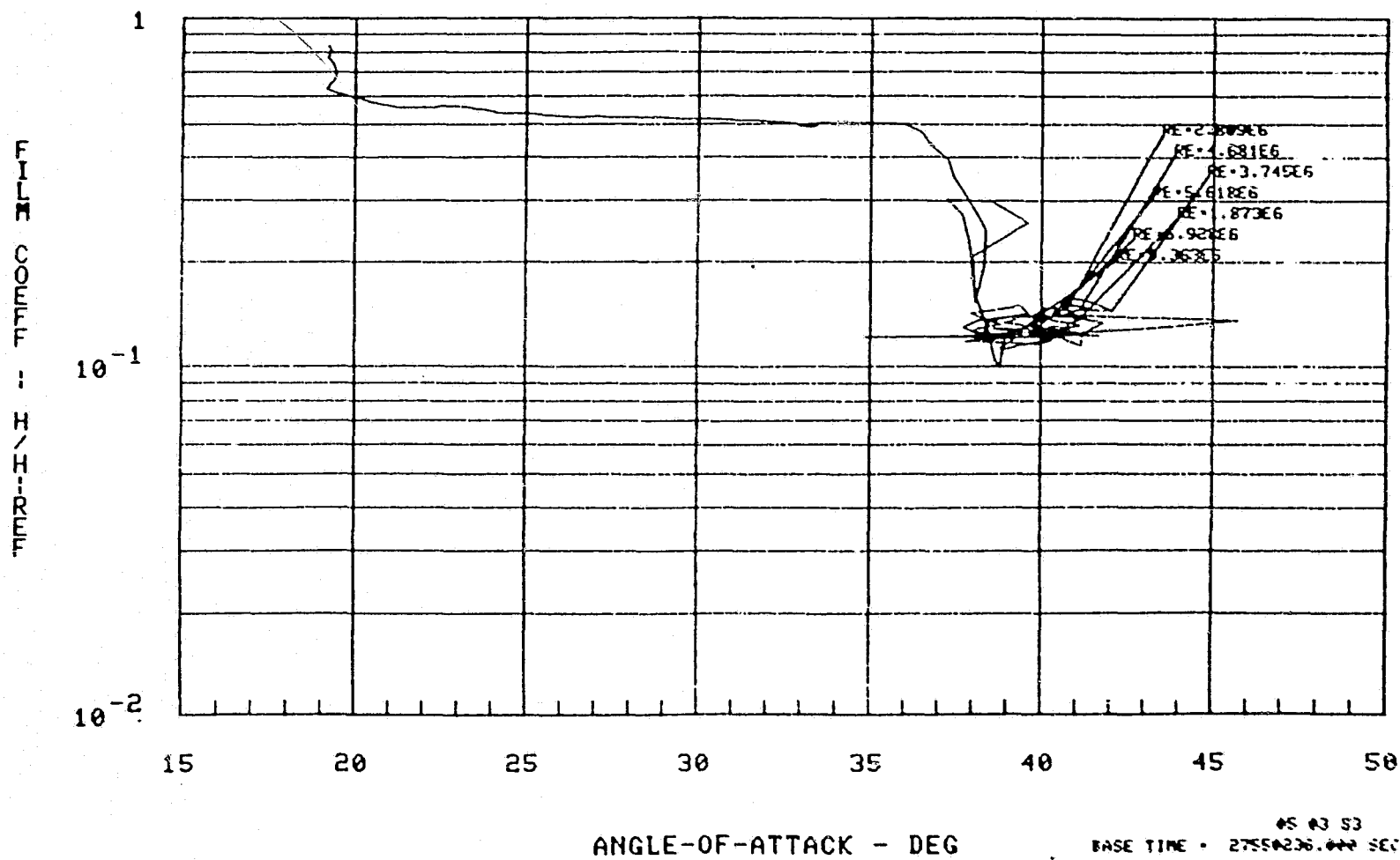
ORIGINAL PLOT
OF POOR QUALITY



B-386

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.77

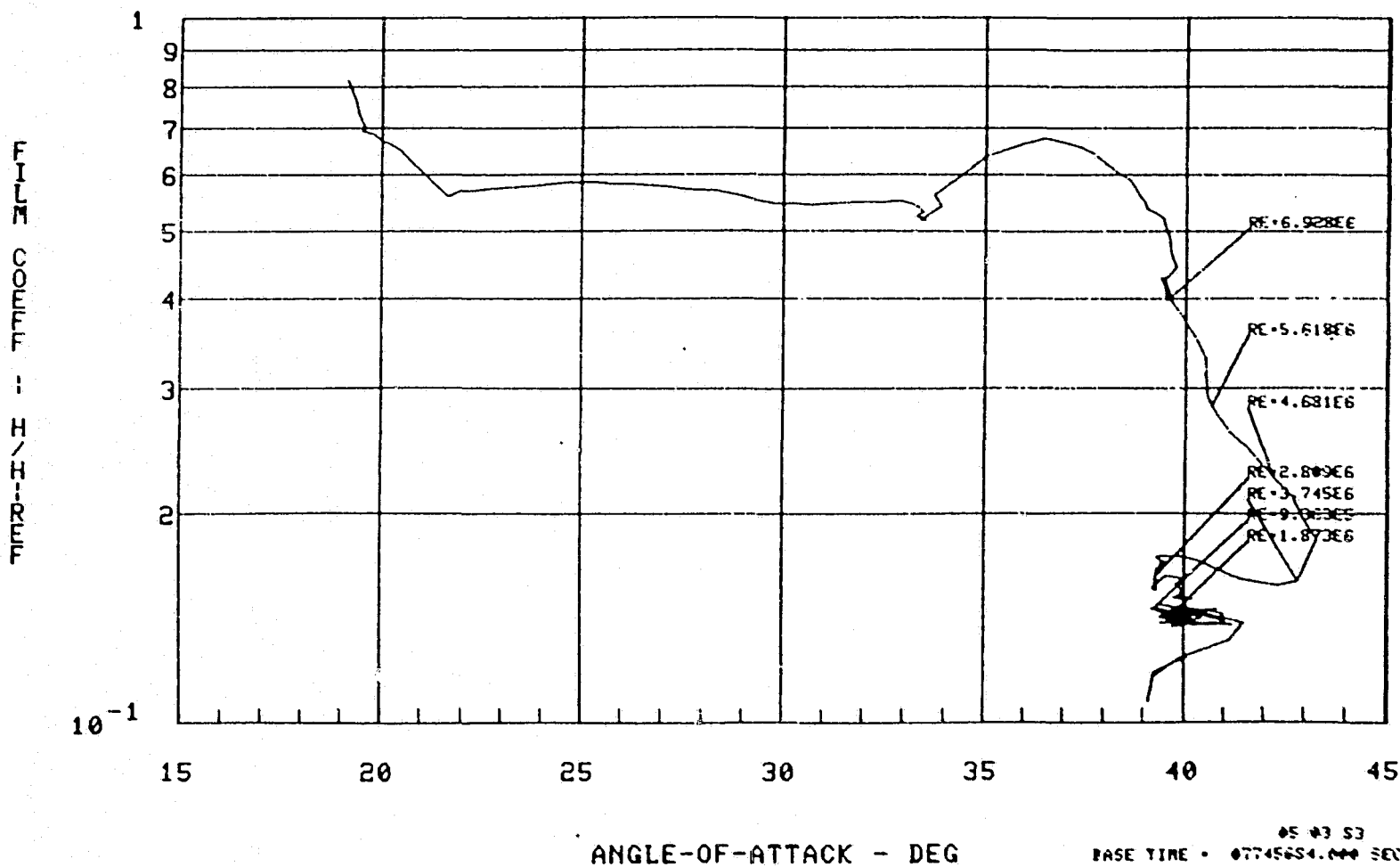
U07T9713A/H-REF 200-1480 SEC



B-387

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 200-1300 SEC

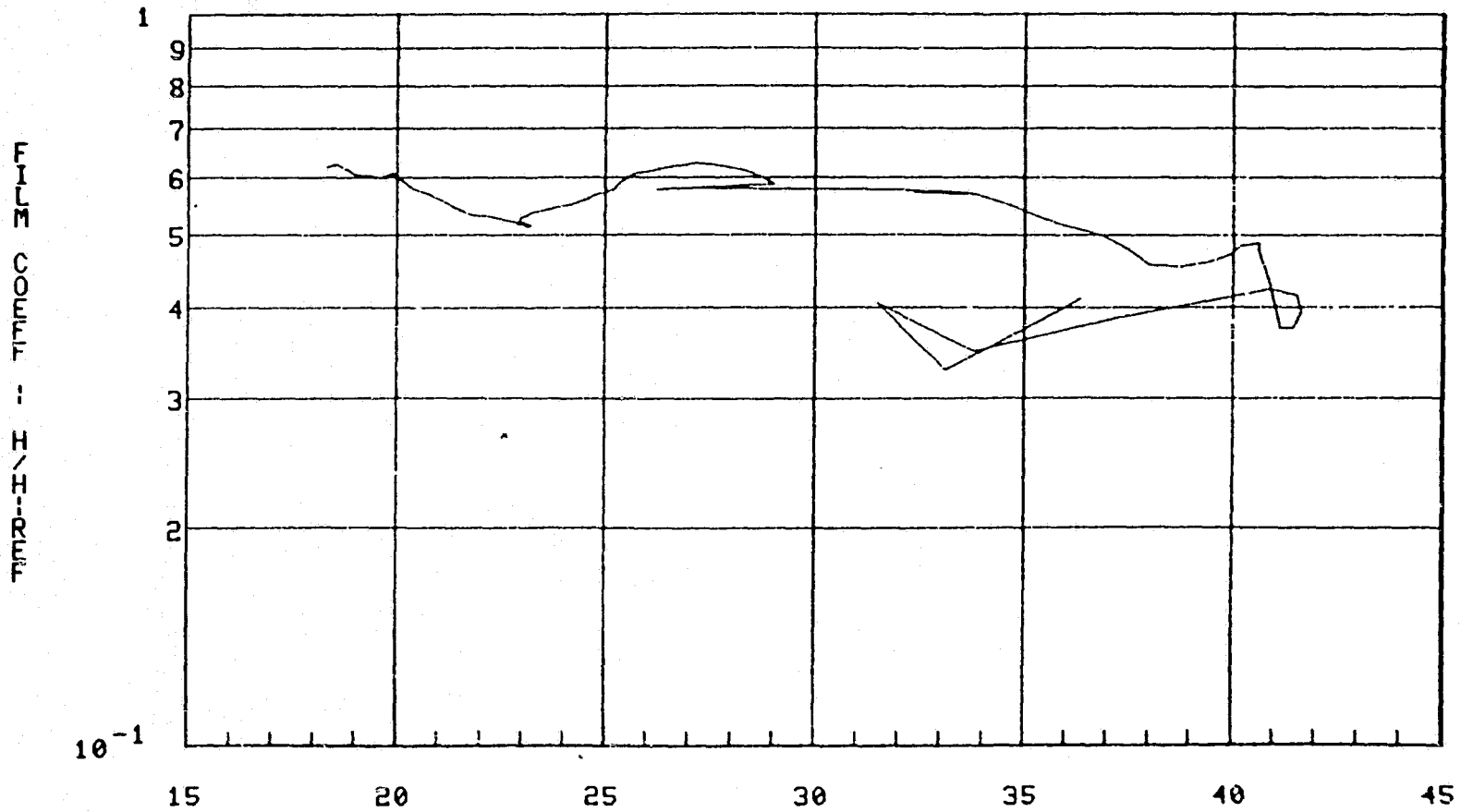


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B-388

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A/H-REF 965-1300 SEC



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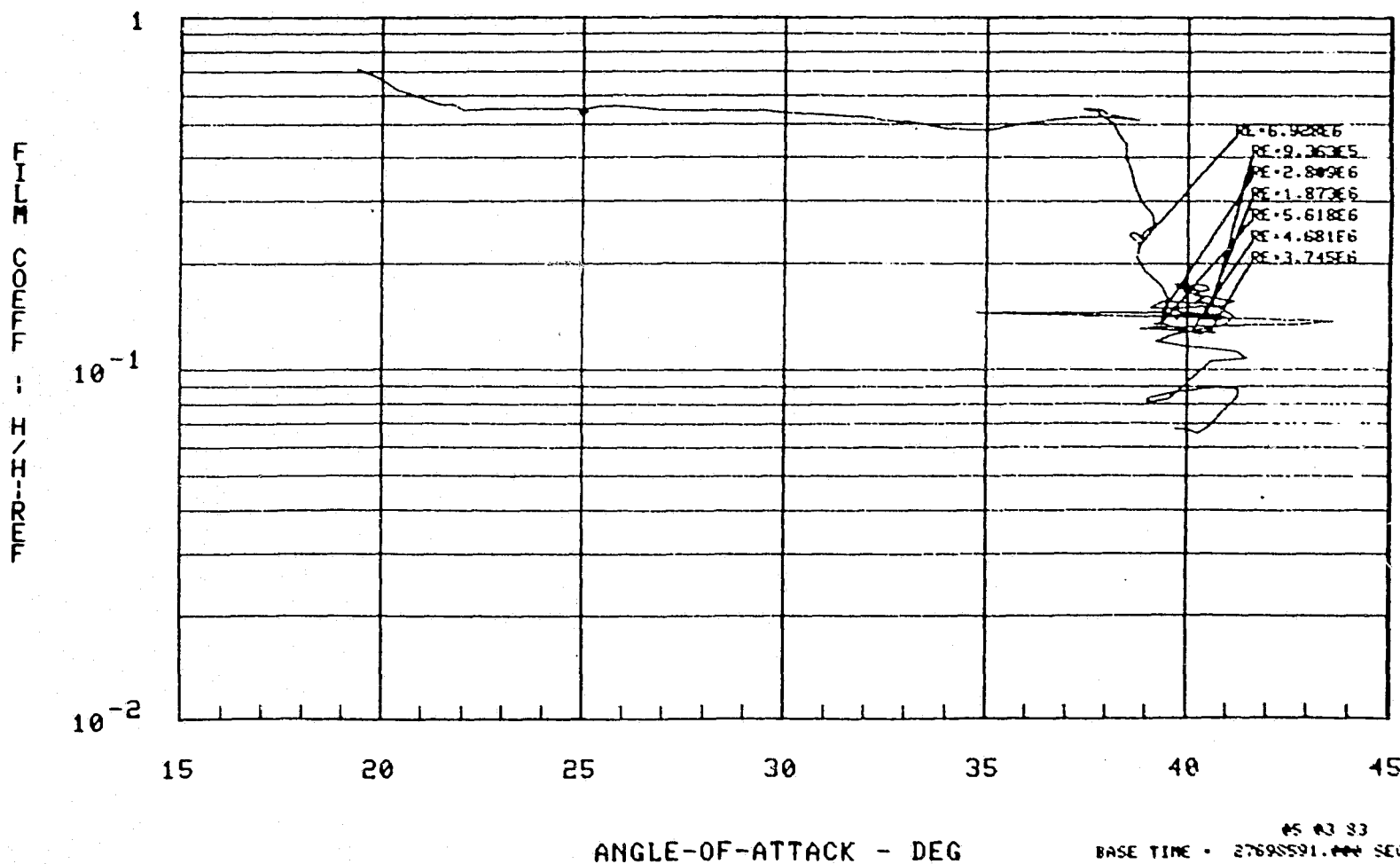
ANGLE-OF-ATTACK - DEG

05:43 S3
BASE TIME = 16040423.000 SEC.

B-389

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A/H-REF 150-1350 SEC

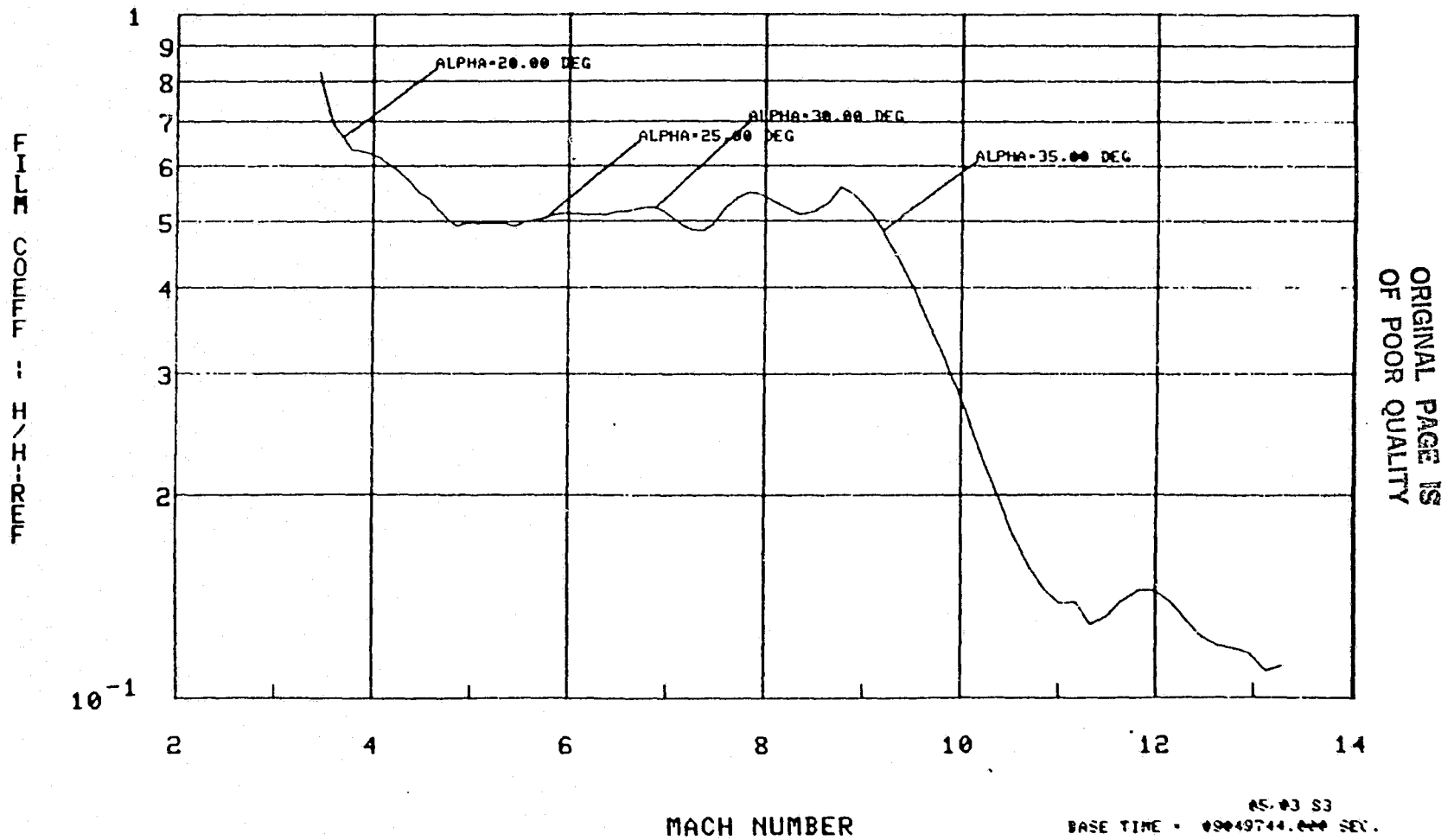


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B-390

STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

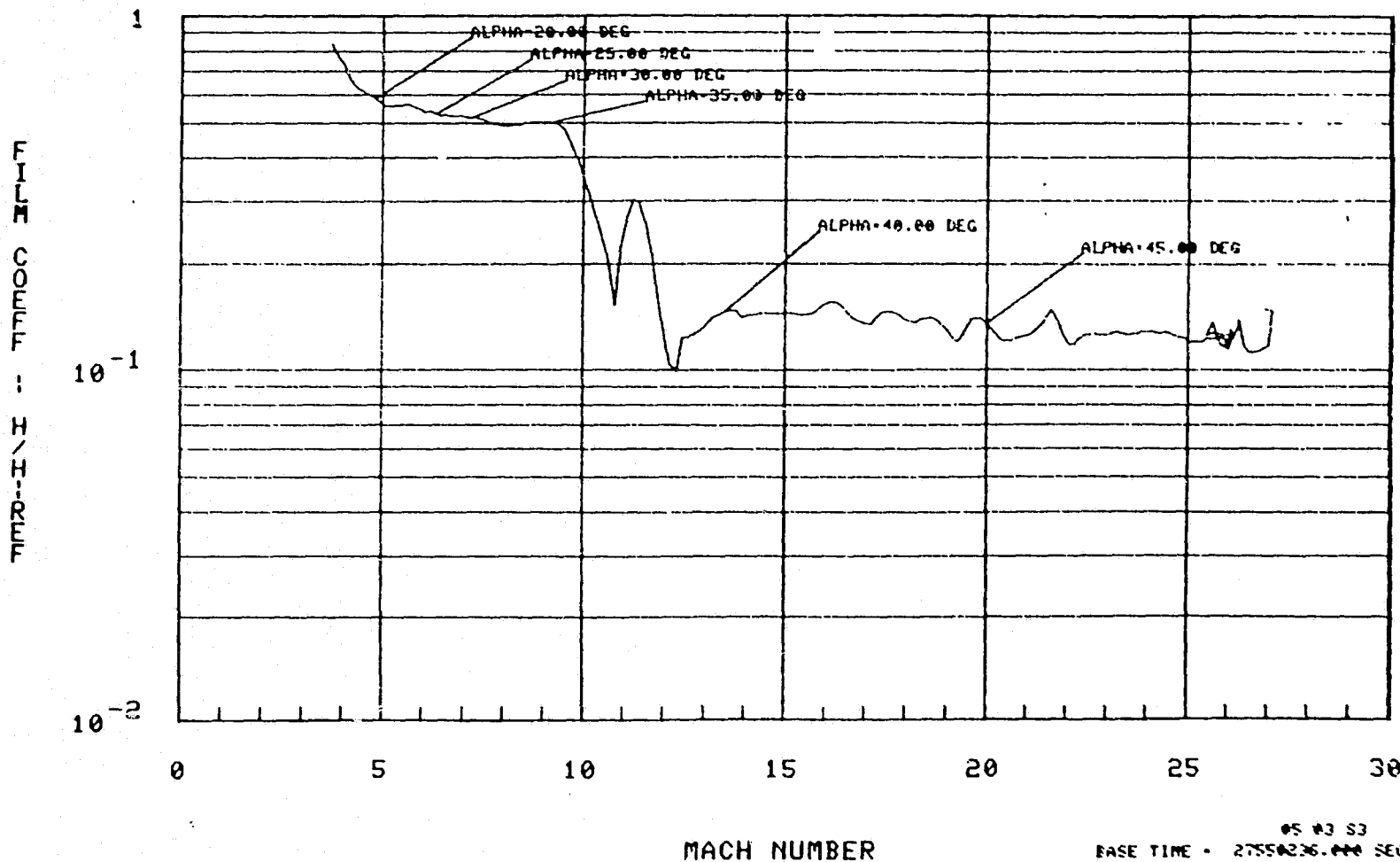
U07T9713A/H-REF 1065-1460 SEC



B-391

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.77

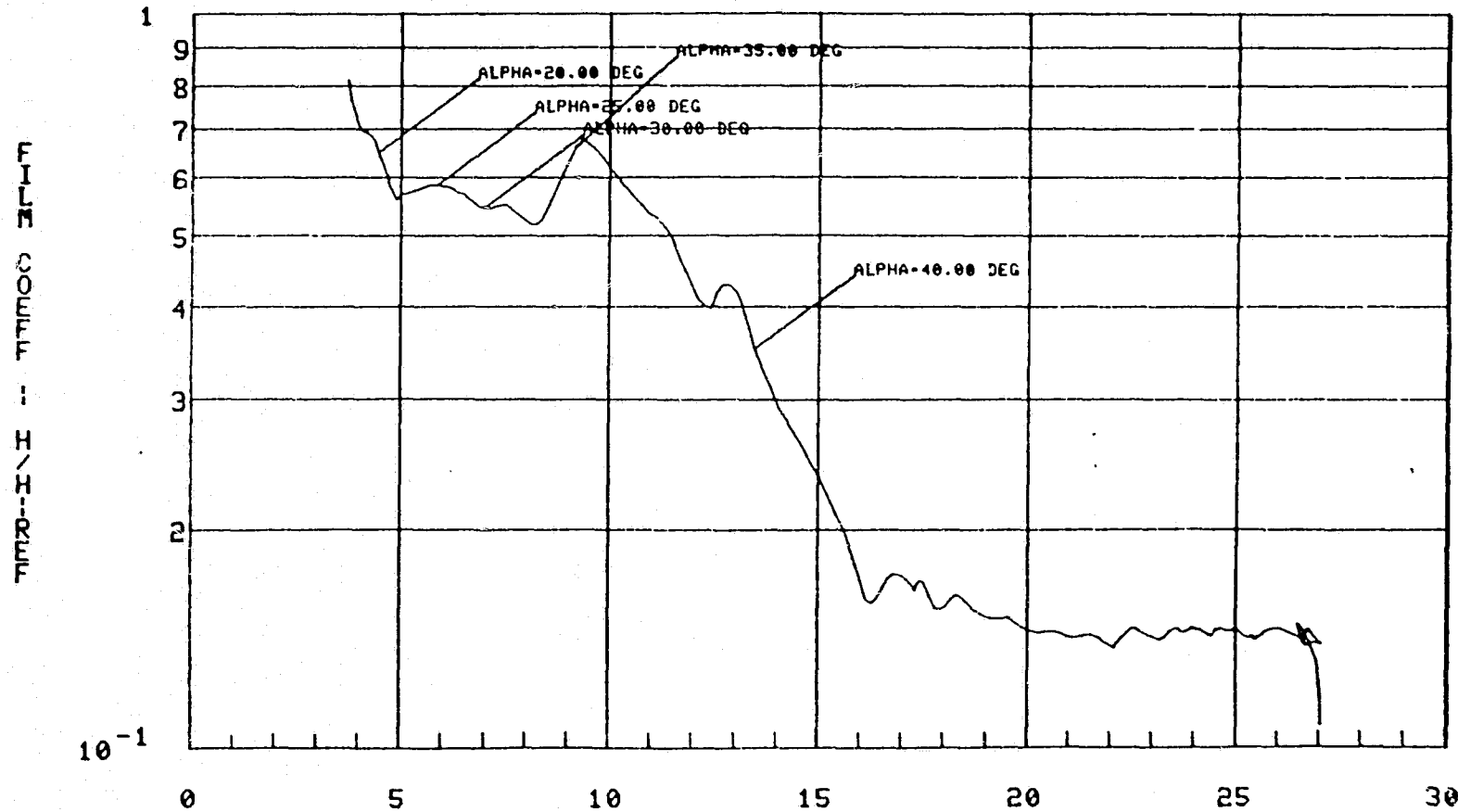
U07T9713A/H-REF 200-1480 SEC



ORIGINAL PAGE IS
OF POOR QUALITY

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 200-1380 SEC



LIFT COEFFICIENT - H/H-REF

ORIGINAL PAGE IS
OF POOR QUALITY

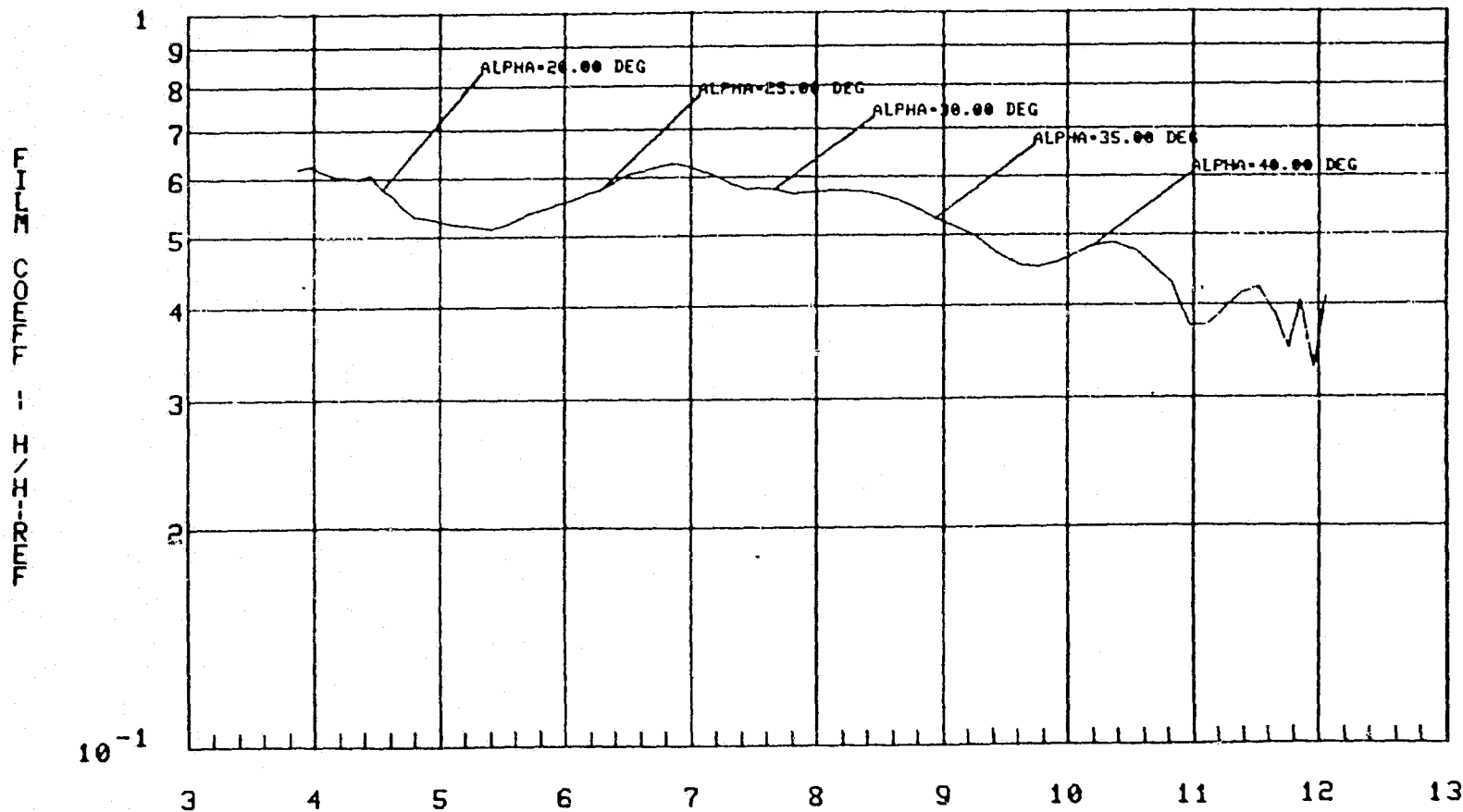
B-393

MACH NUMBER

05 03 S3
BASE TIME = 077456S4.000 SEC.

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 965-1300 SEC



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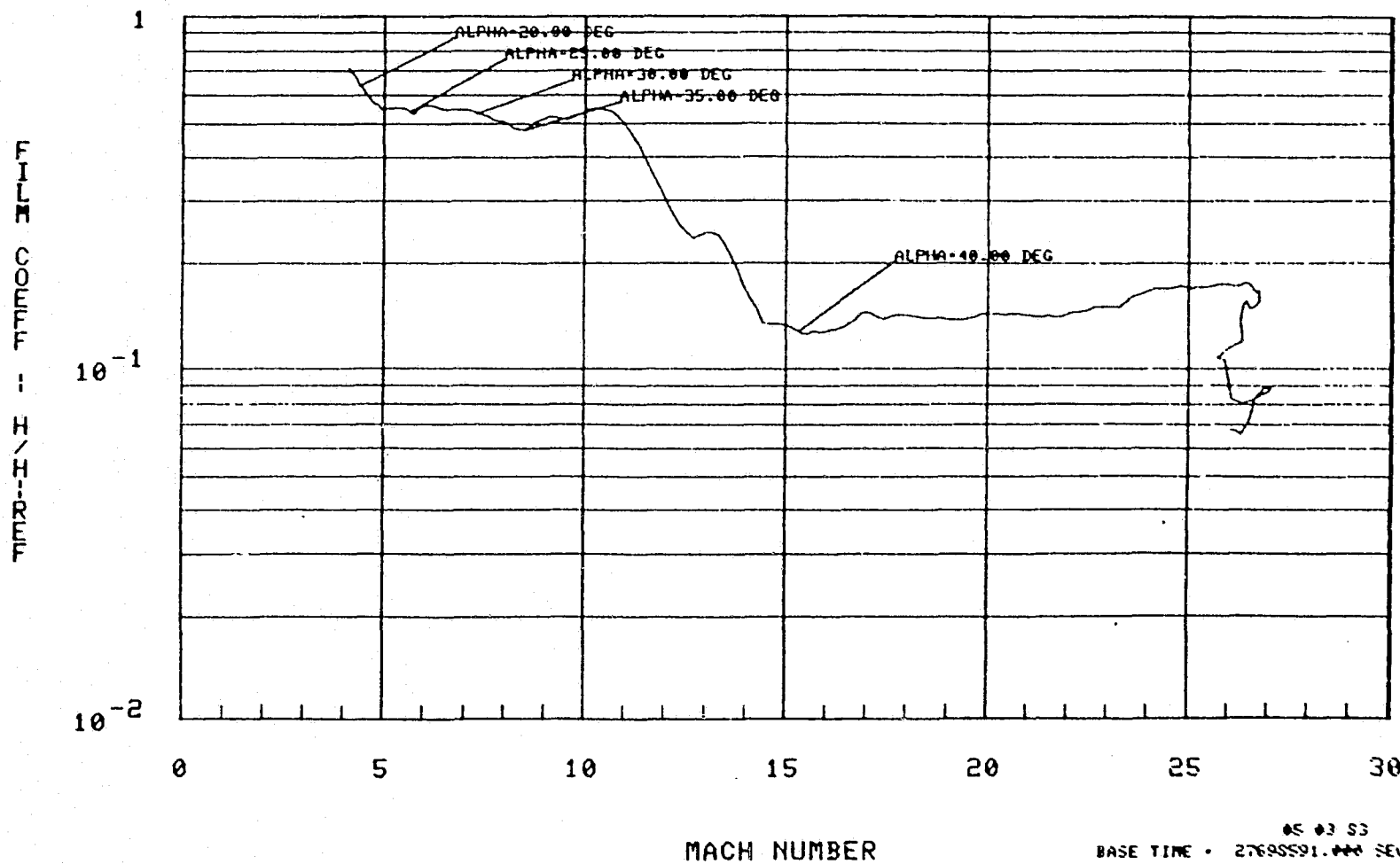
MACH NUMBER

05 03 S3
BASE TIME - 16040423.000 SEC.

B-394

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 150-1350 SEC



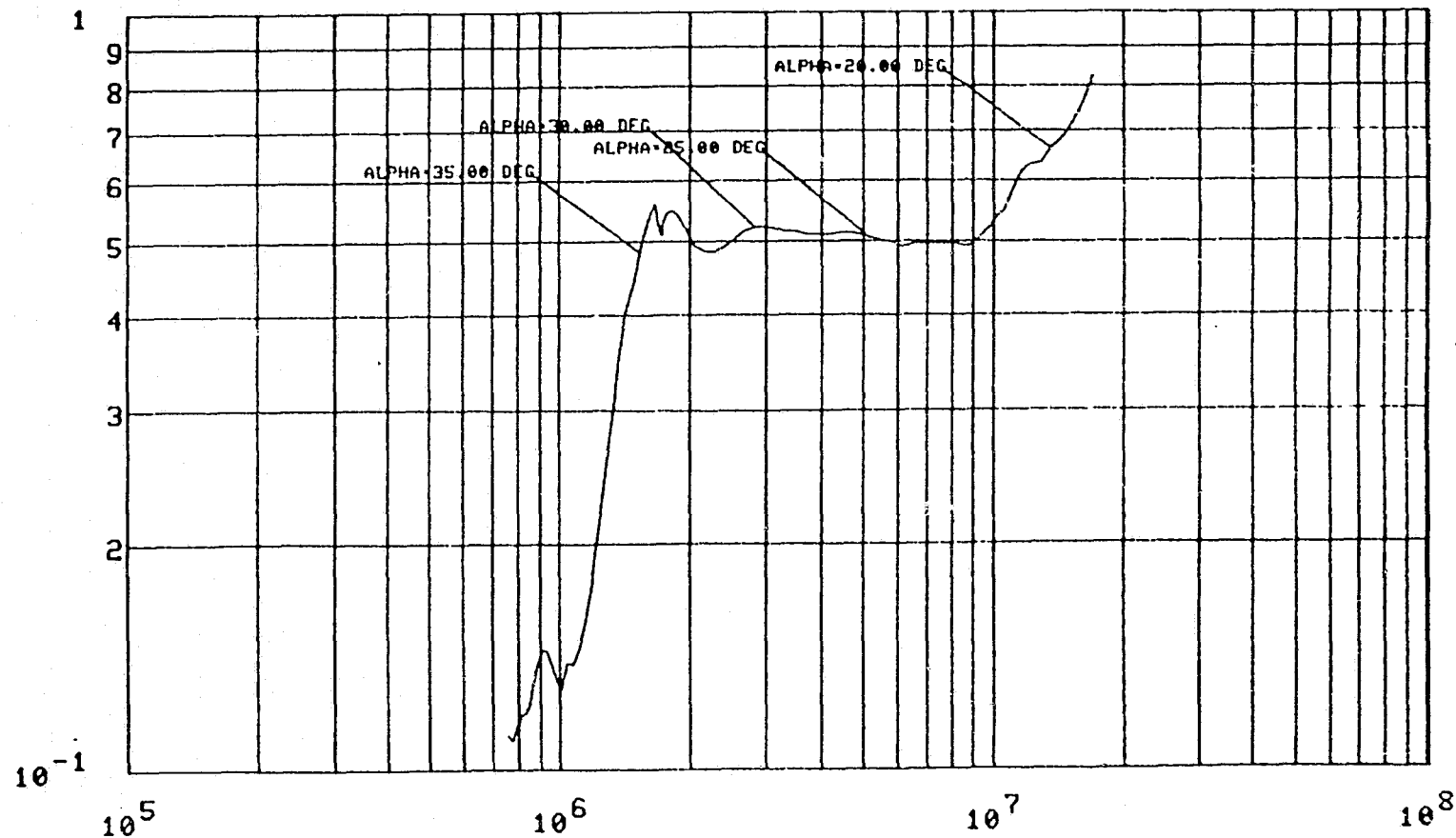
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STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 1065-1460 SEC

FILE 000000 - H/H-REF

B-396



REYNOLDS NUMBER (NS)

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09049744.000 SEC.

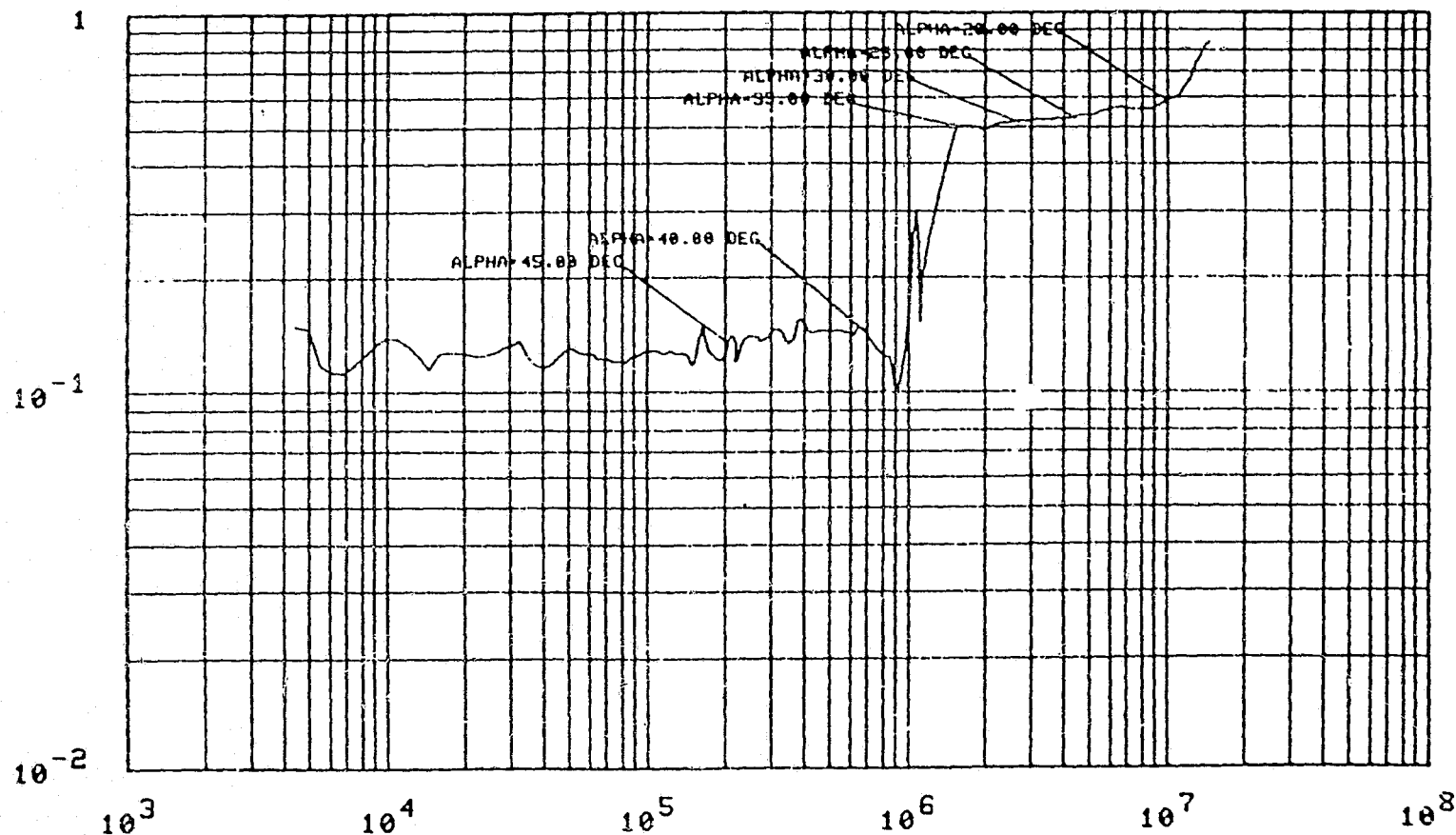
ORIGINAL PAGE 17
OF POOR QUALITY

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A/H-REF 200-1480 SEC

FILE C00111 - H-REF

B-397



REYNOLDS NUMBER (NS)

BASE TIME = 275502.000 SEC.

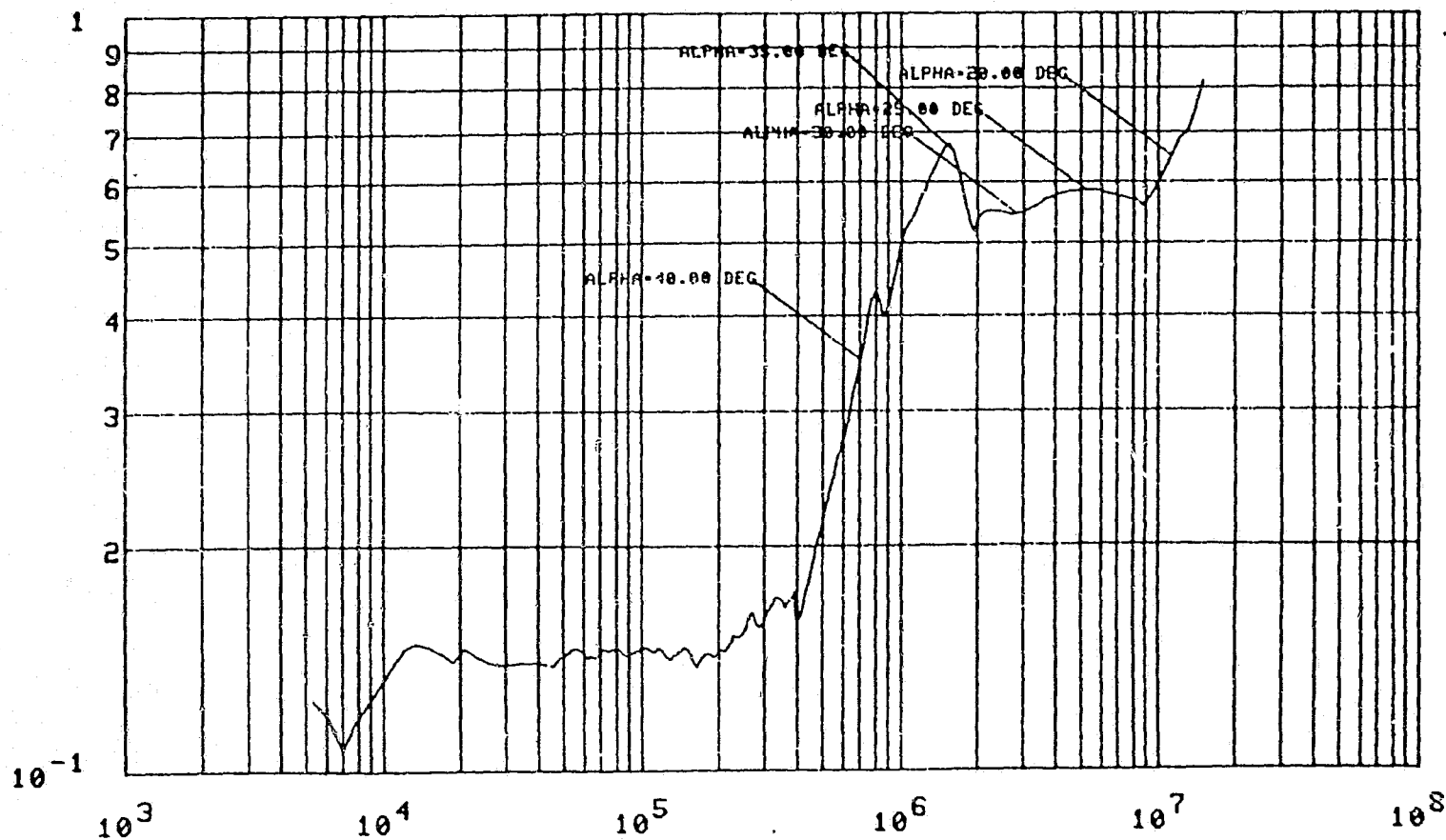
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STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 200-1380 SEC

TIME COULE - H/H-REF

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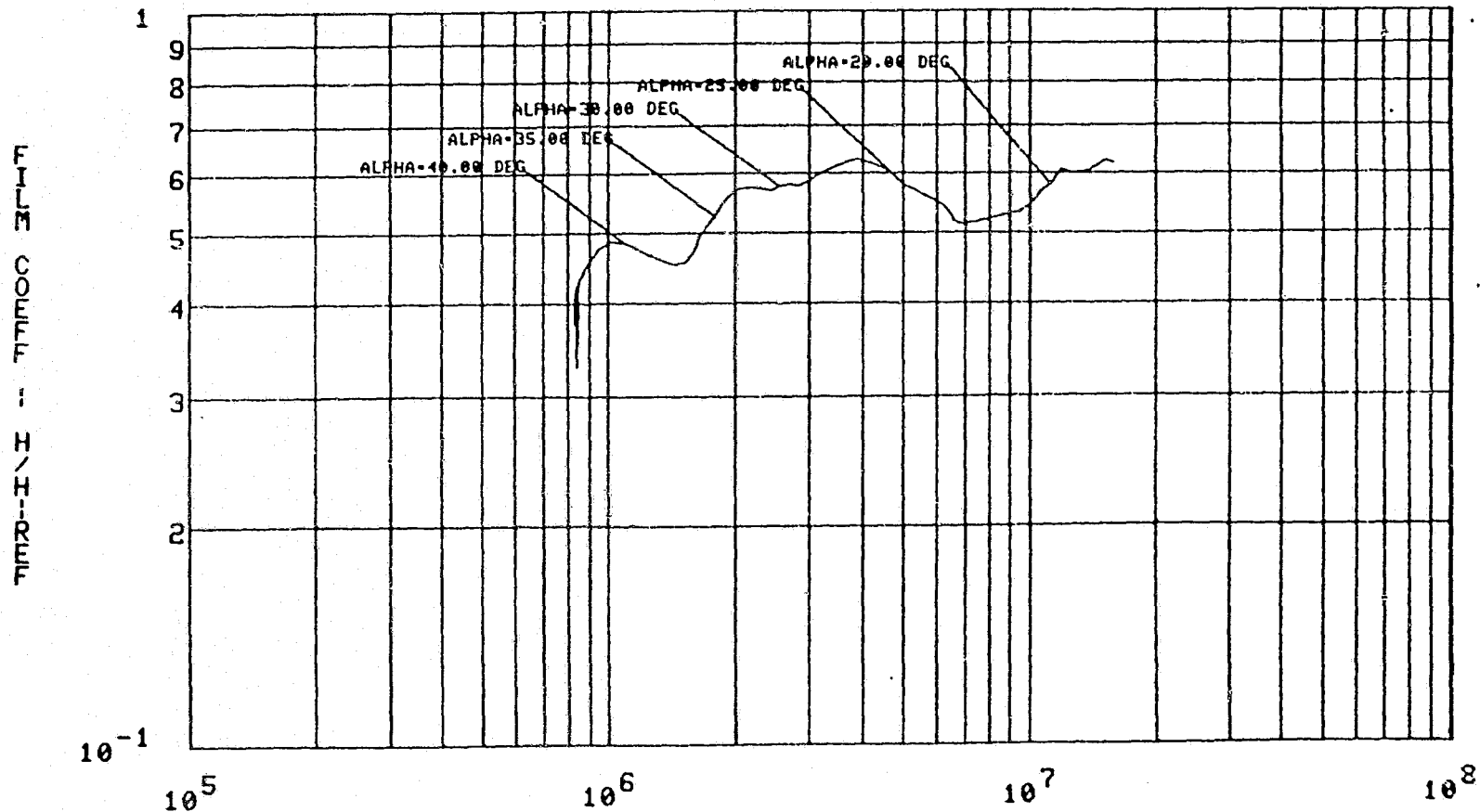
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PS 03 S3
BASE TIME - 077456S4.000 SEC.

B-398

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A/H-REF 965-1300 SEC



LINE COULDN'T BE PLOTTED

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B-399

REYNOLDS NUMBER (NS)

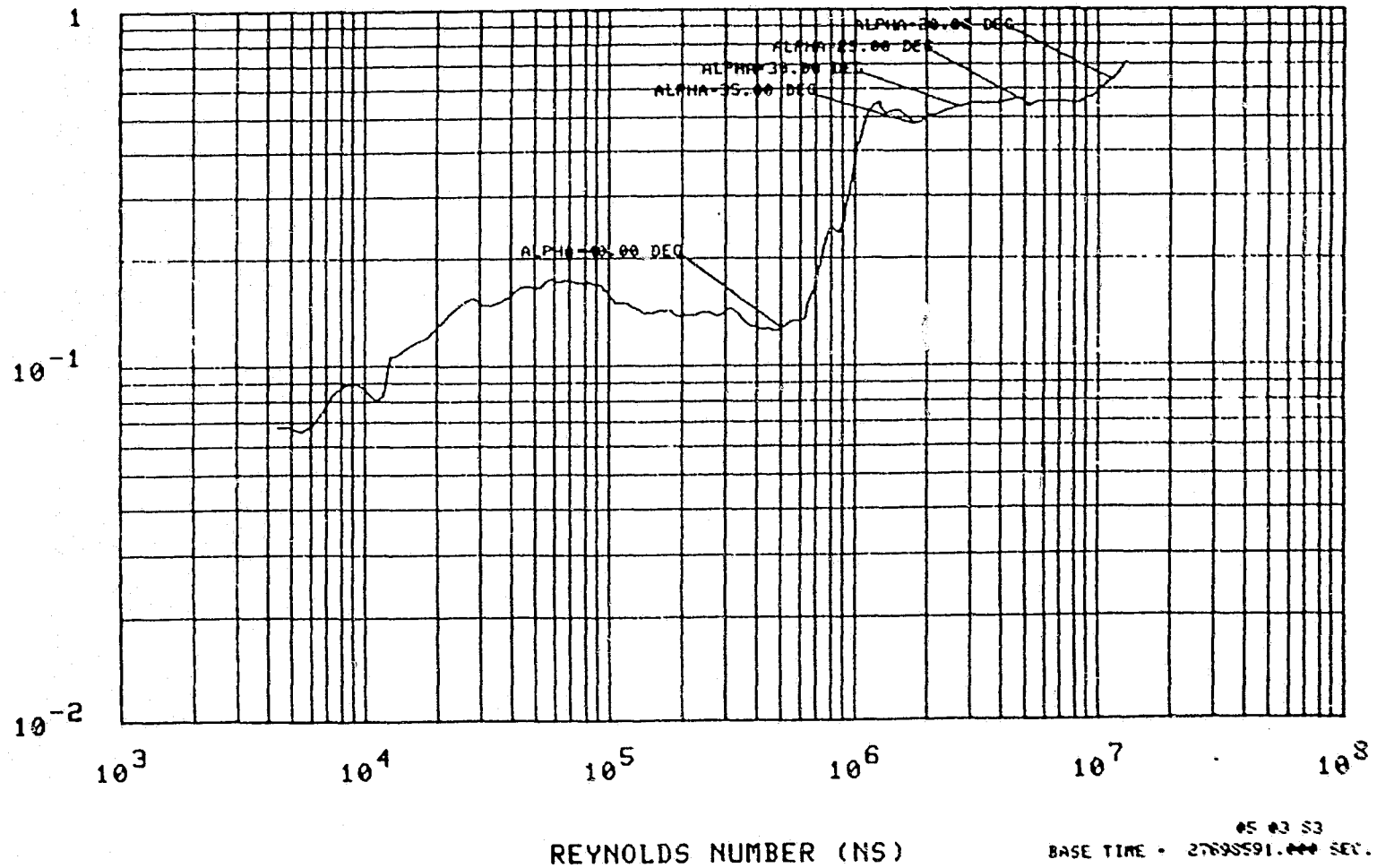
05-03 83
BASE TIME = 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A/H-REF 150-1350 SEC

LINE CODE -- H-I-R-ALL

B-400



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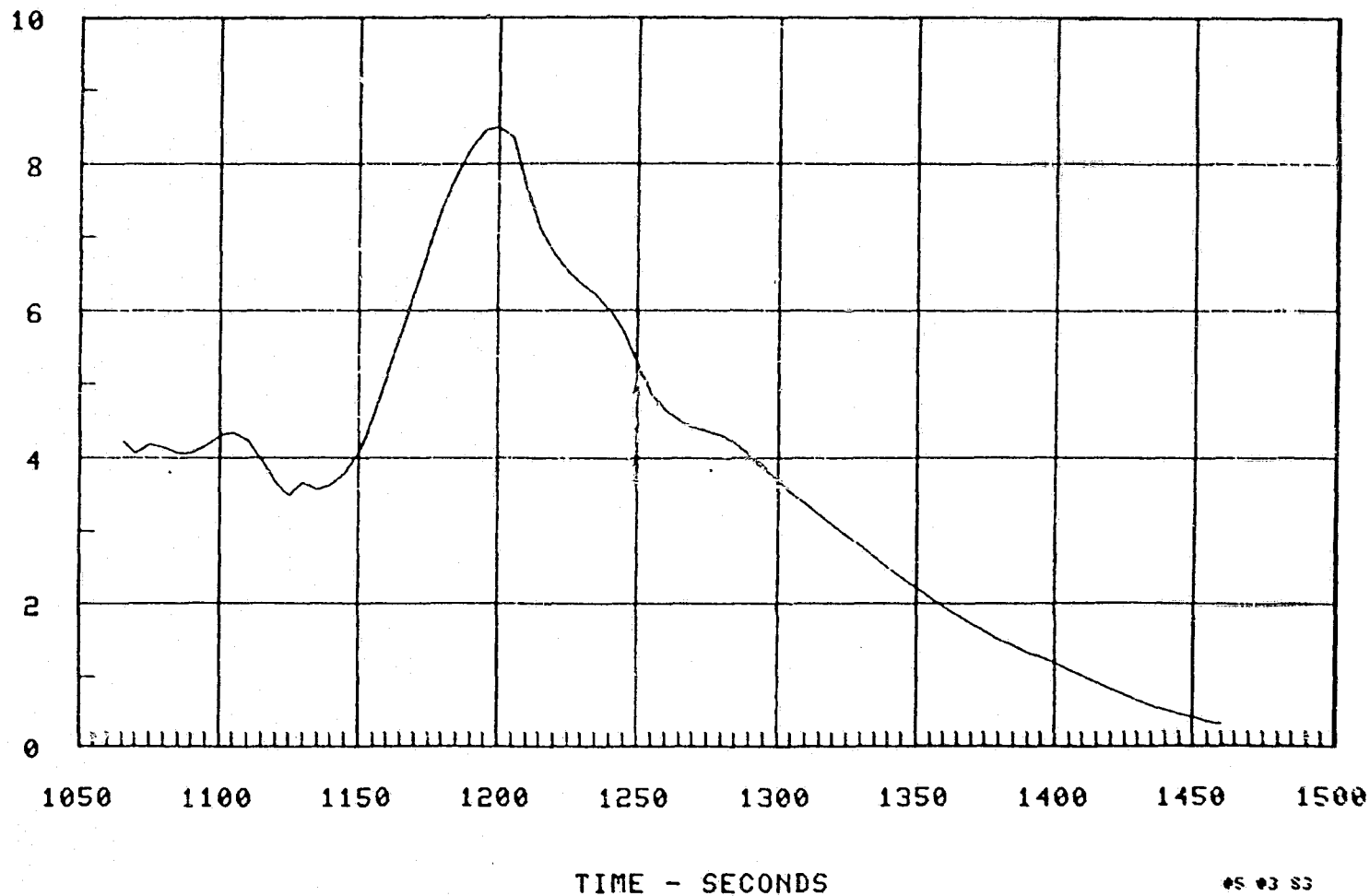
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U07T9713A

HEATING RATE -- BUILDING -- SMC

B-401

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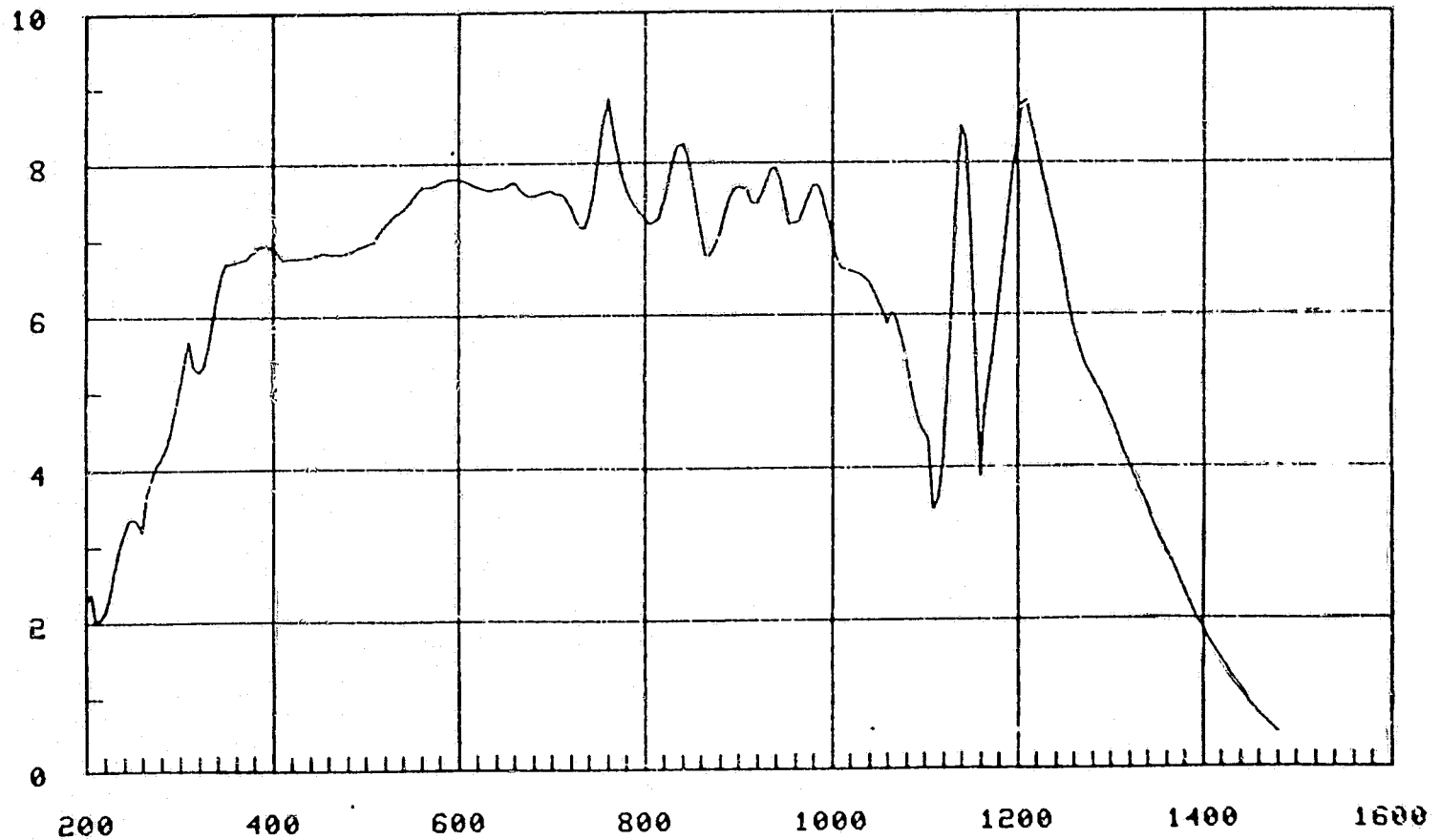


#5 #3 S3

STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A

HEATING RATE - BUILDING - SEC



ORIGINAL FIGURE
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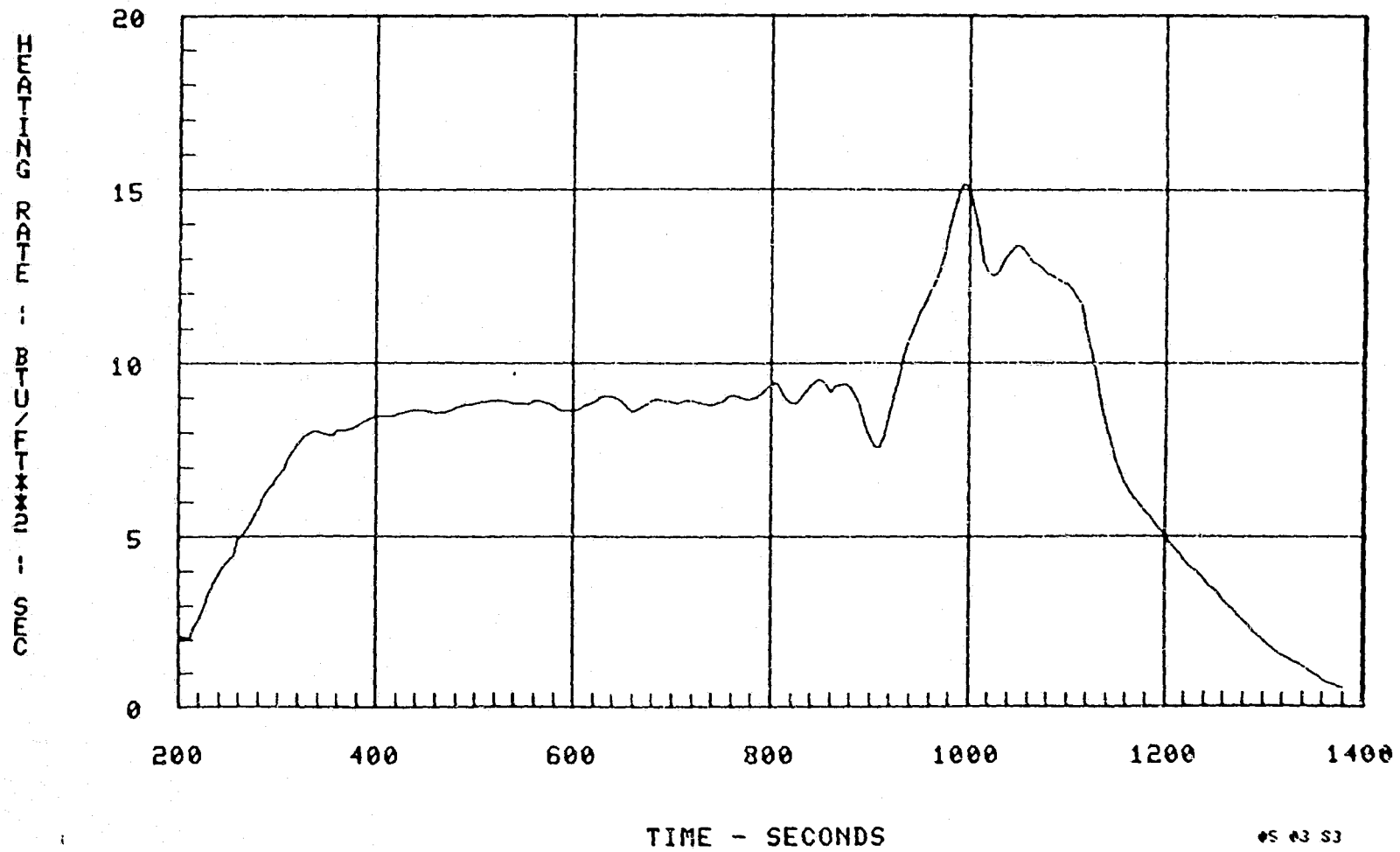
TIME - SECONDS

05 03 53

B-402

STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A



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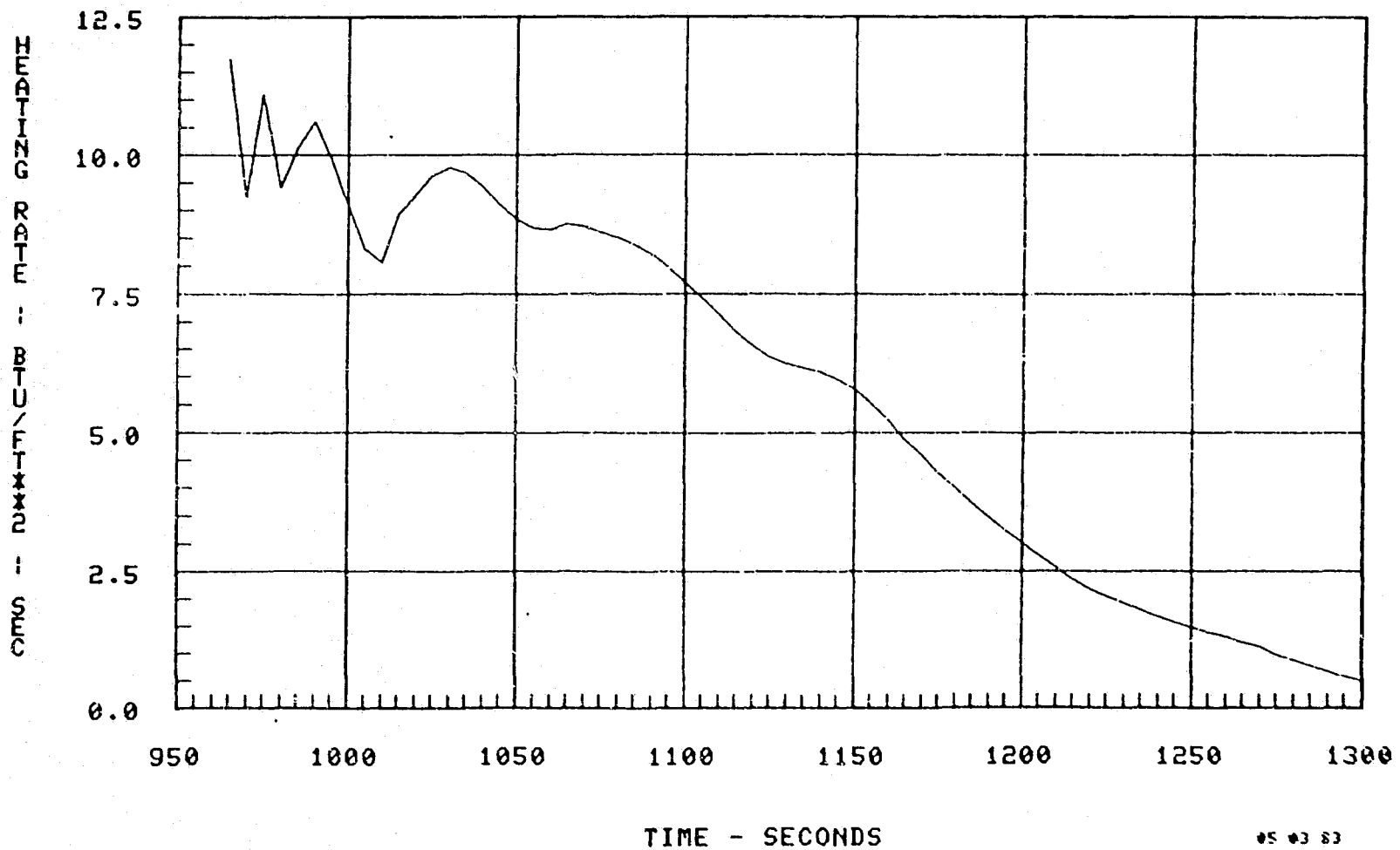
05 43 53

B-403

C-6

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U0719713A

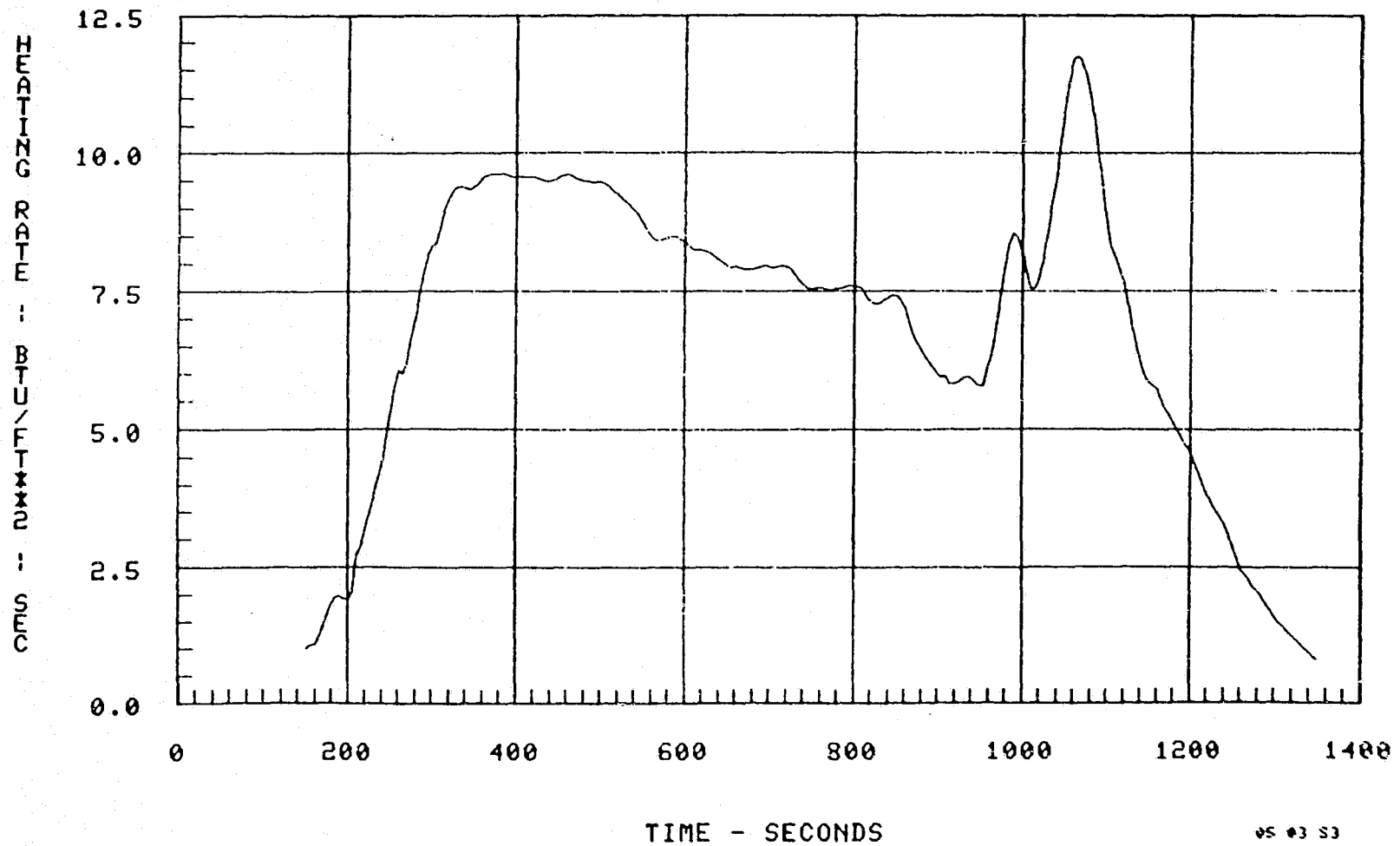


B-404

05 03 83

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U87T9713A



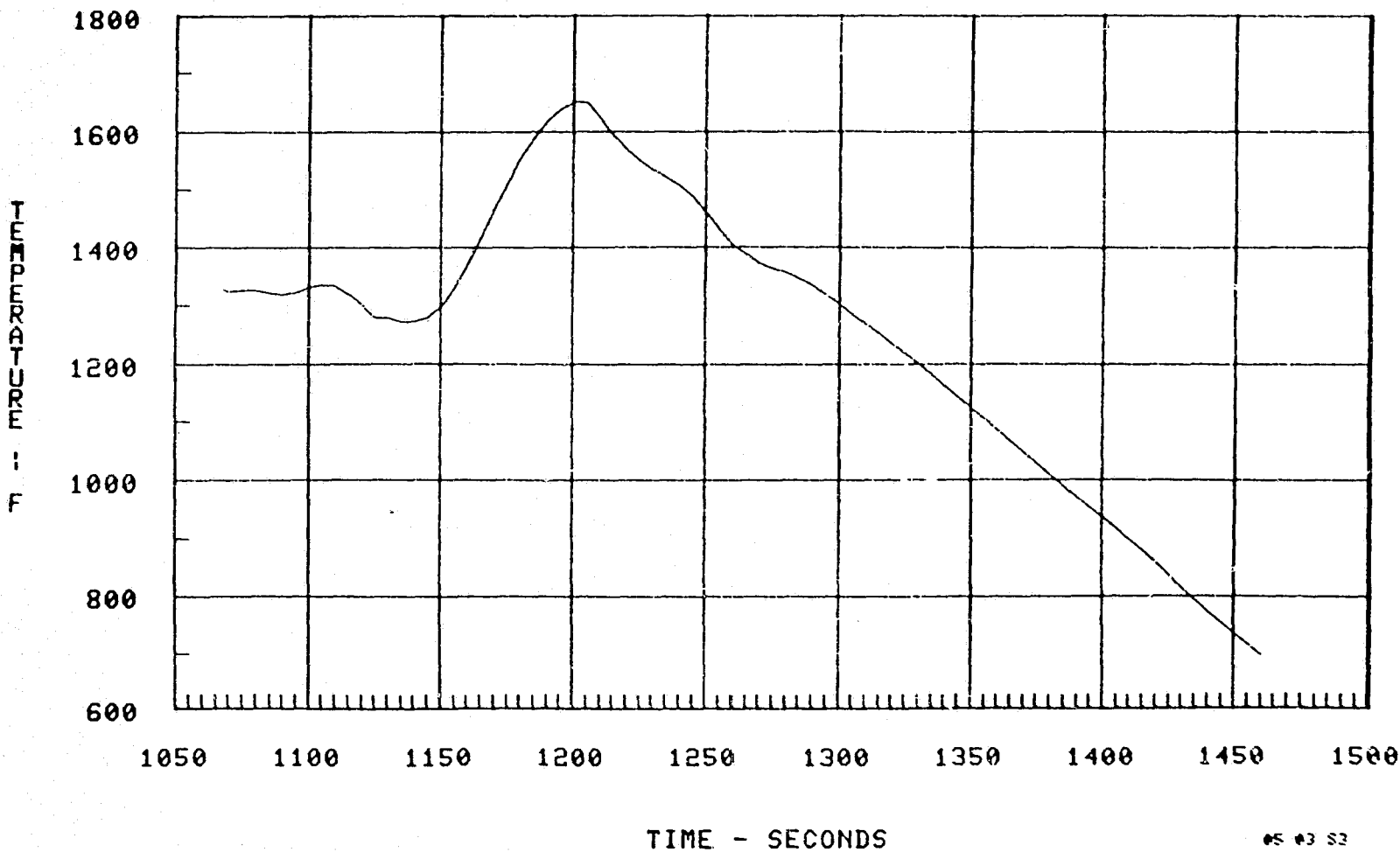
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B-405

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V07T9713A

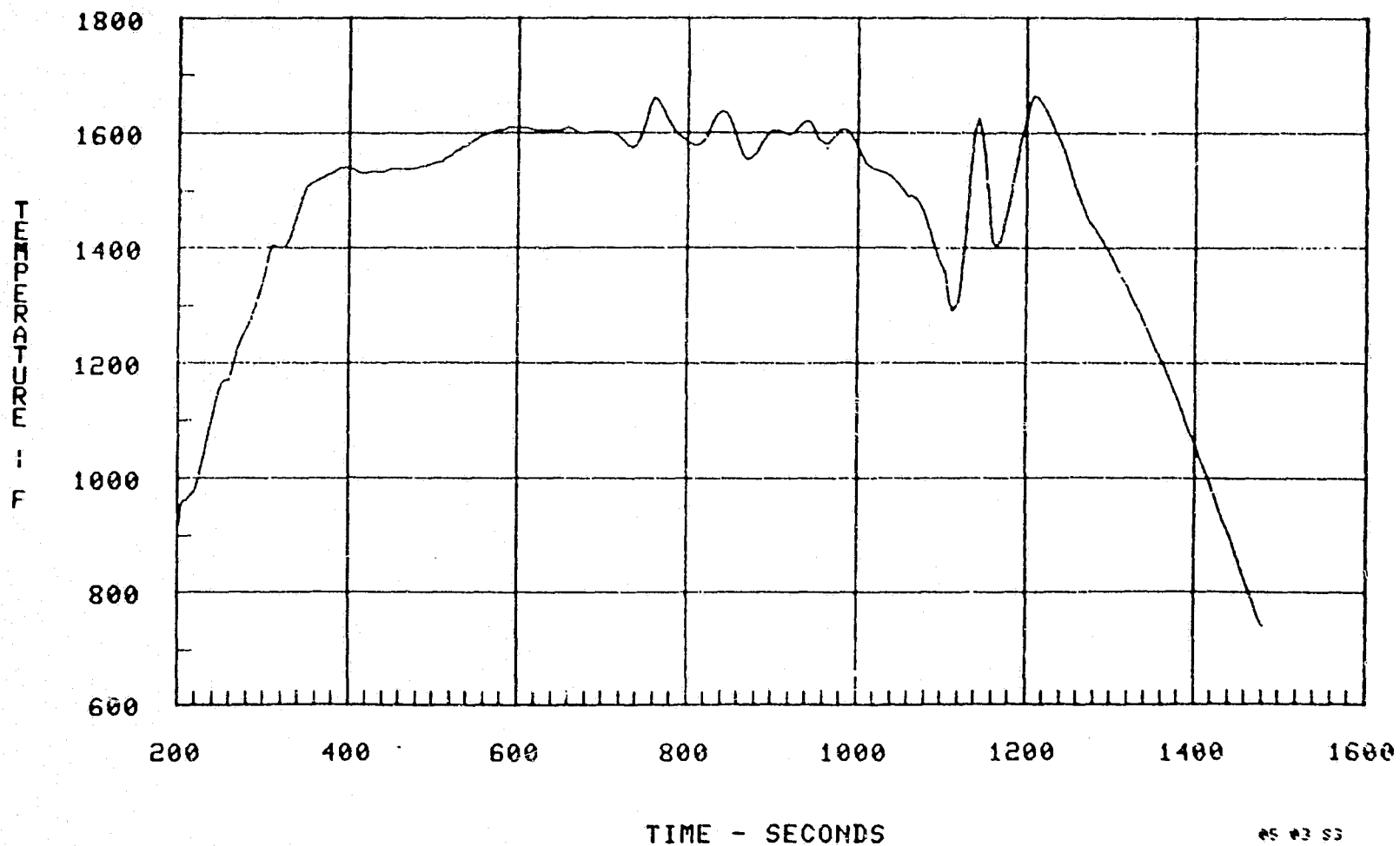


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B-406

STS-2 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A



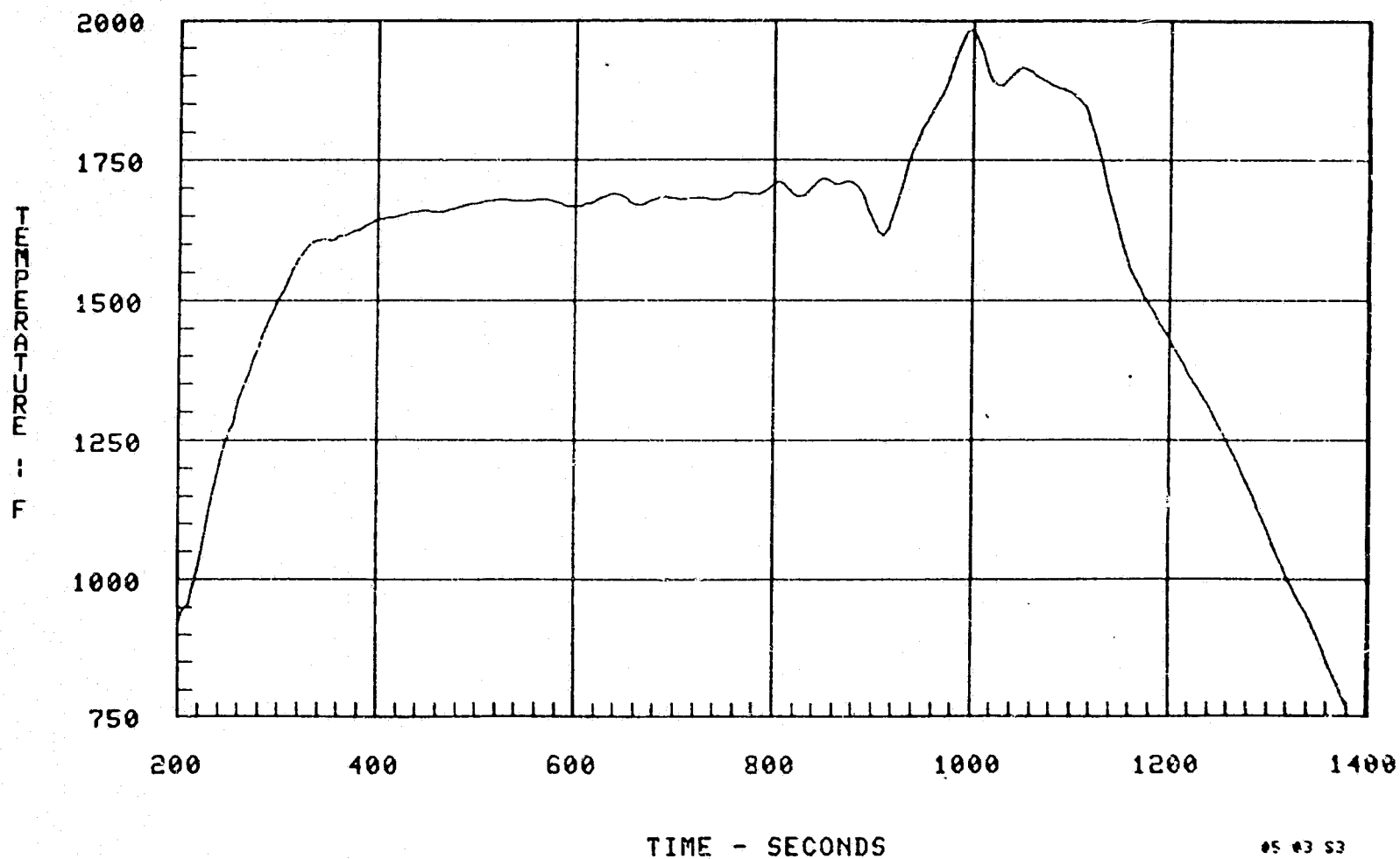
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AS 43 SS

B-407

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A



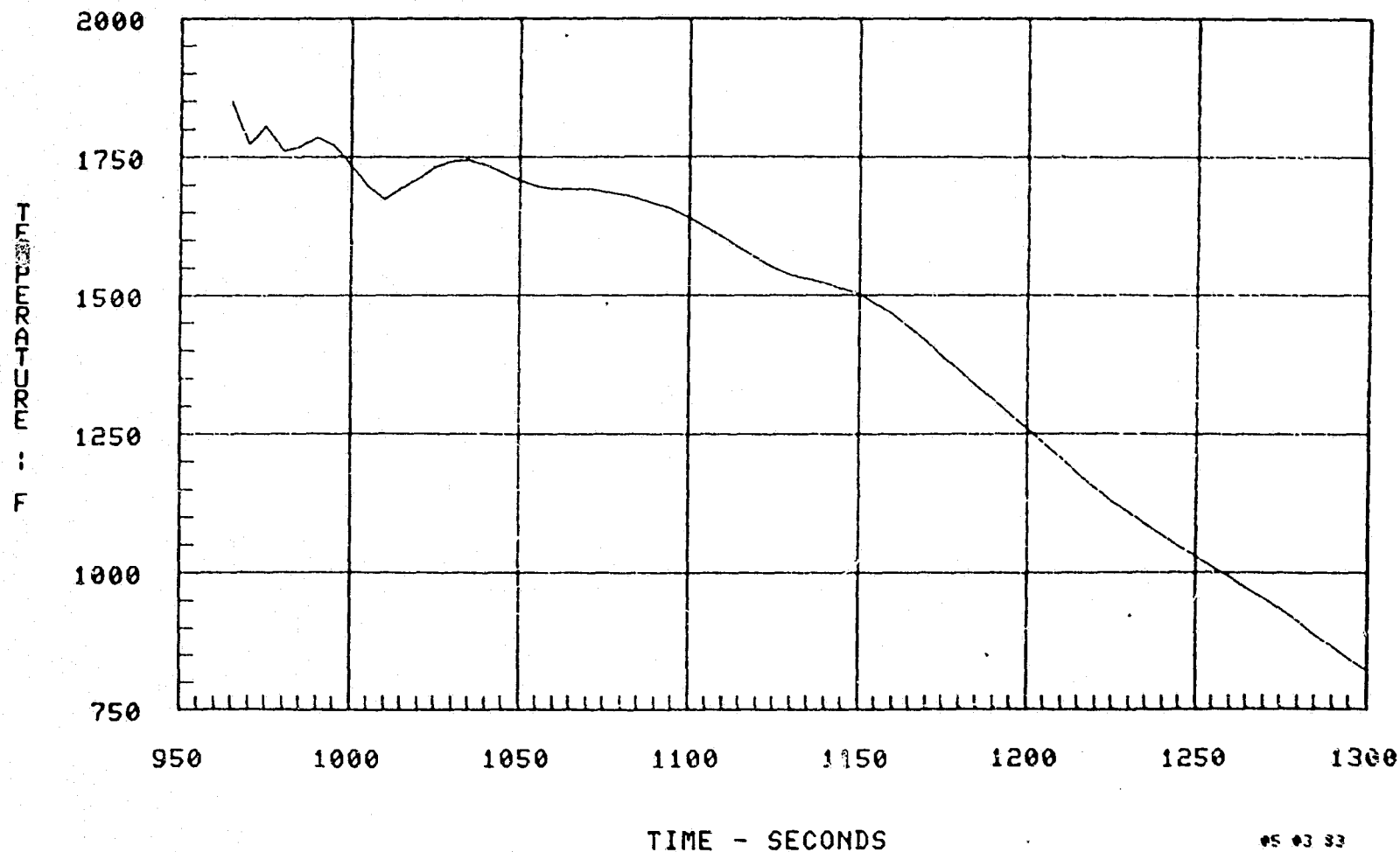
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B-408

05 03 53

STS-4 (107 FT LENGTH WING 80% SPAN) $X/C=0.77$

U07T9713A

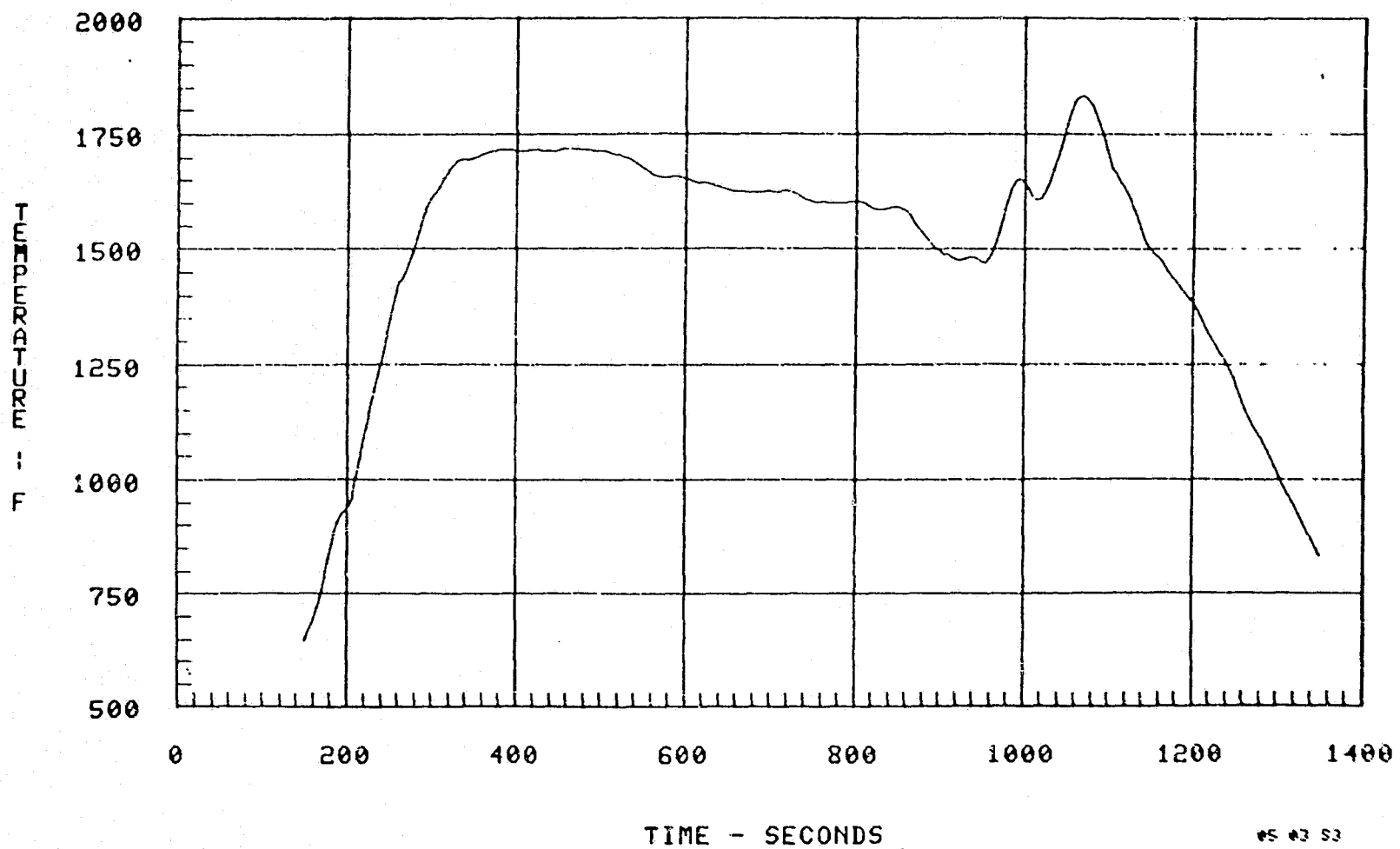


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B-409

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.77

U07T9713A

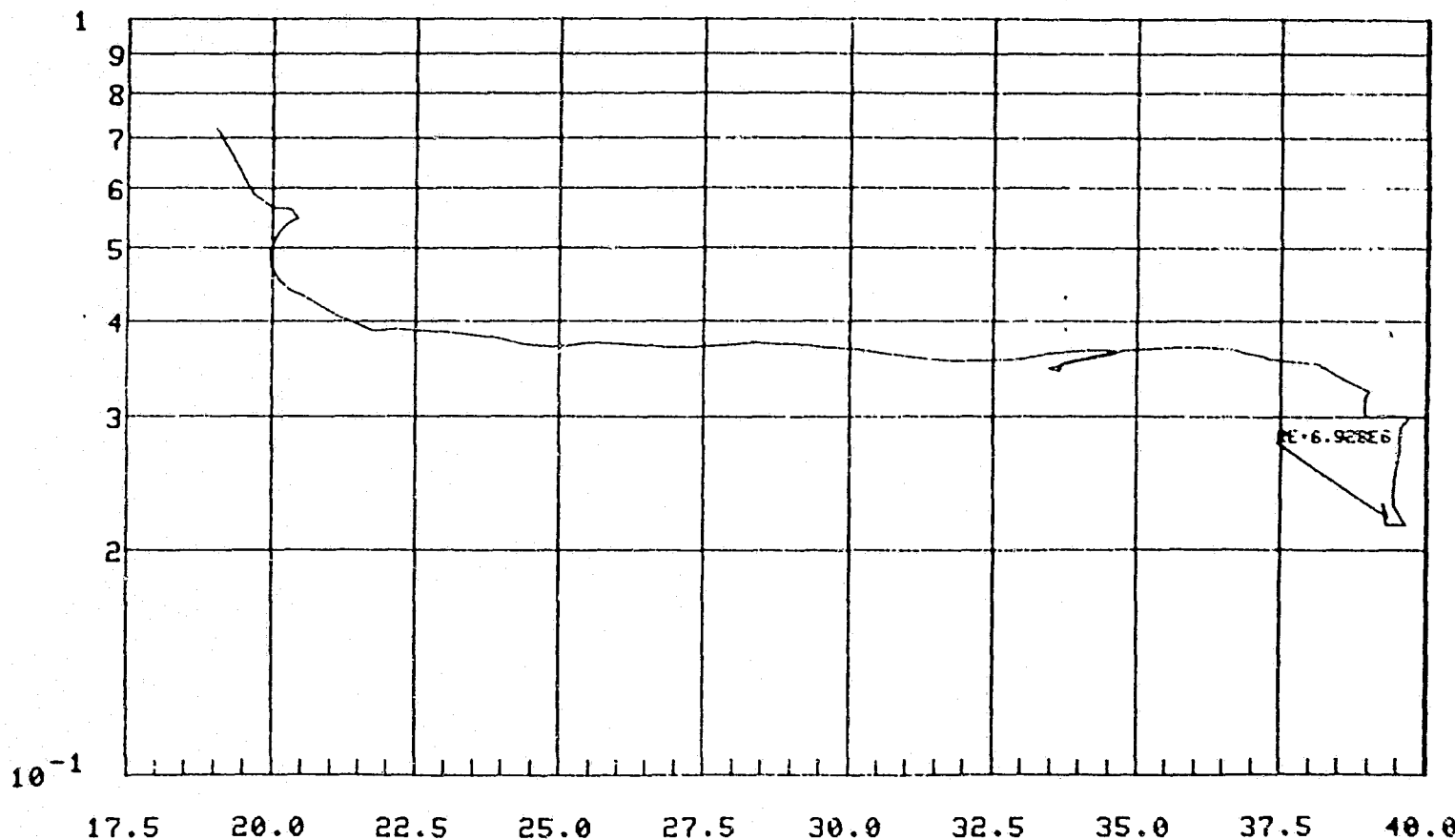


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STS-1 (107 FT LENGTH WING 80% SPAN) $X/C=0.98$

U07T9714A/H-REF 1065-1460 SEC

WING COEFF - C_{L}/C_{D}



RE-6.928E6

ANGLE-OF-ATTACK - DEG

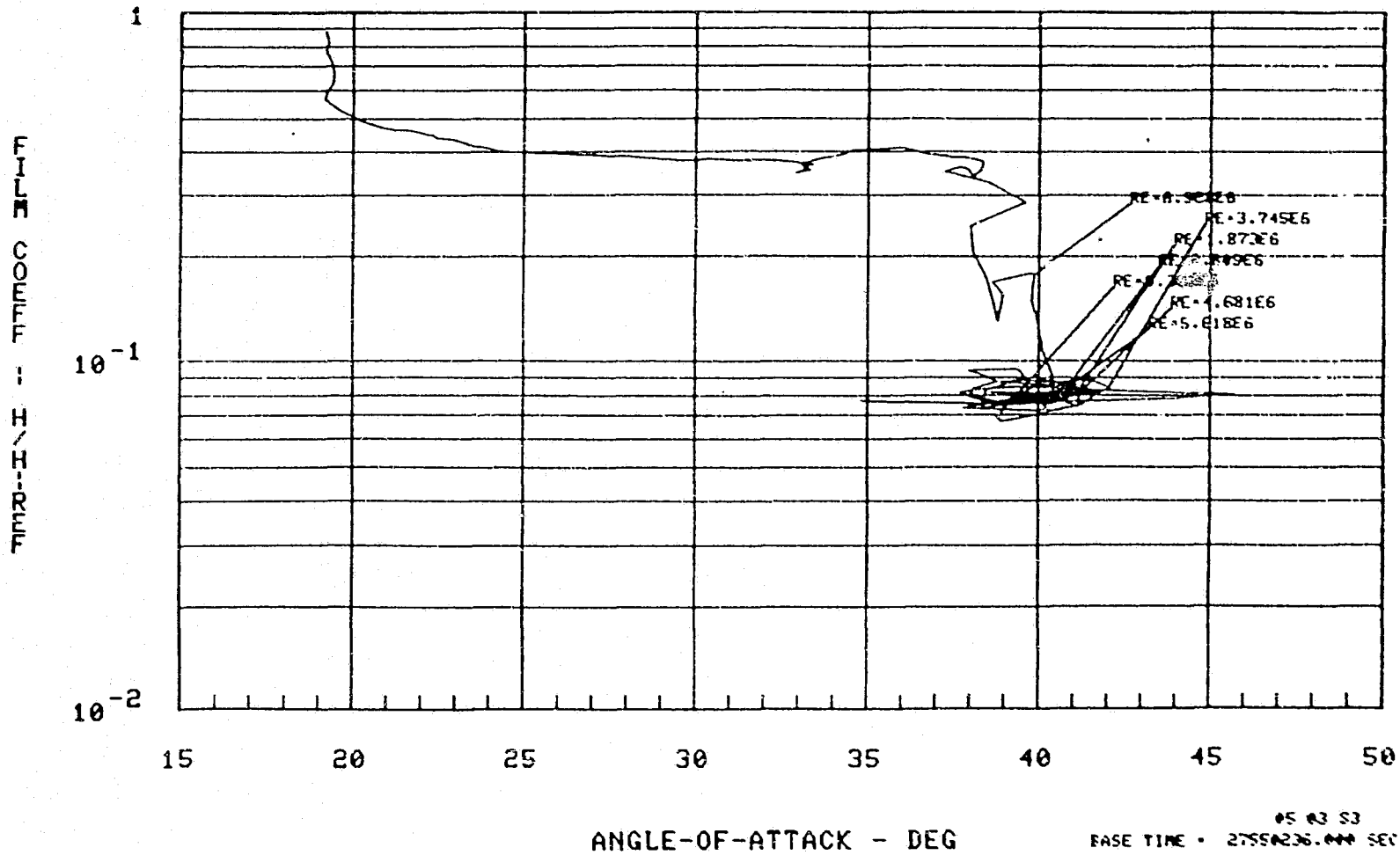
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B-411

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U07T9714A/H-REF 200-1480 SEC



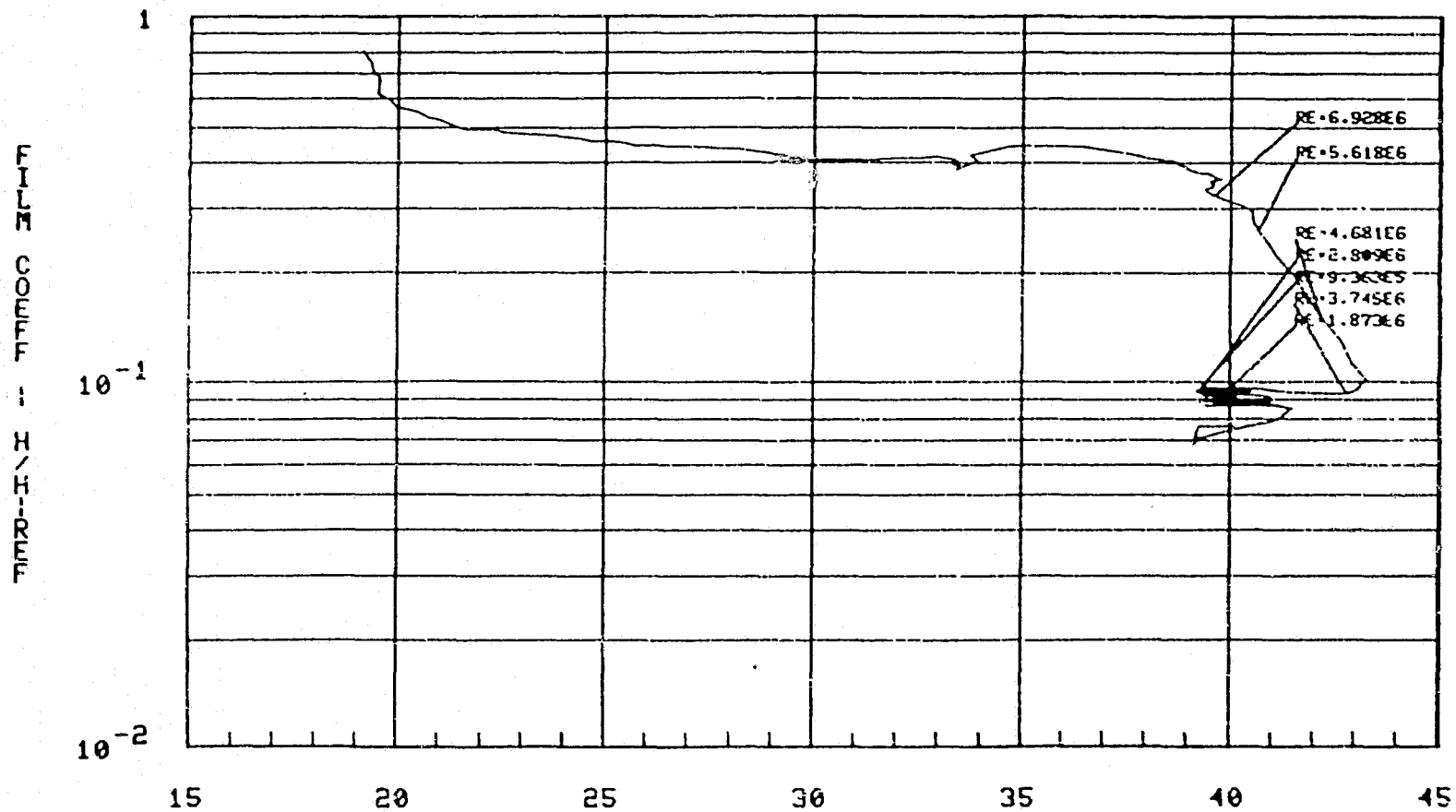
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#5 #3 S3
BASE TIME = 27550236.000 SEC.

B-412

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U07T9714A/H-REF 200-1380 SEC



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ANGLE-OF-ATTACK - DEG

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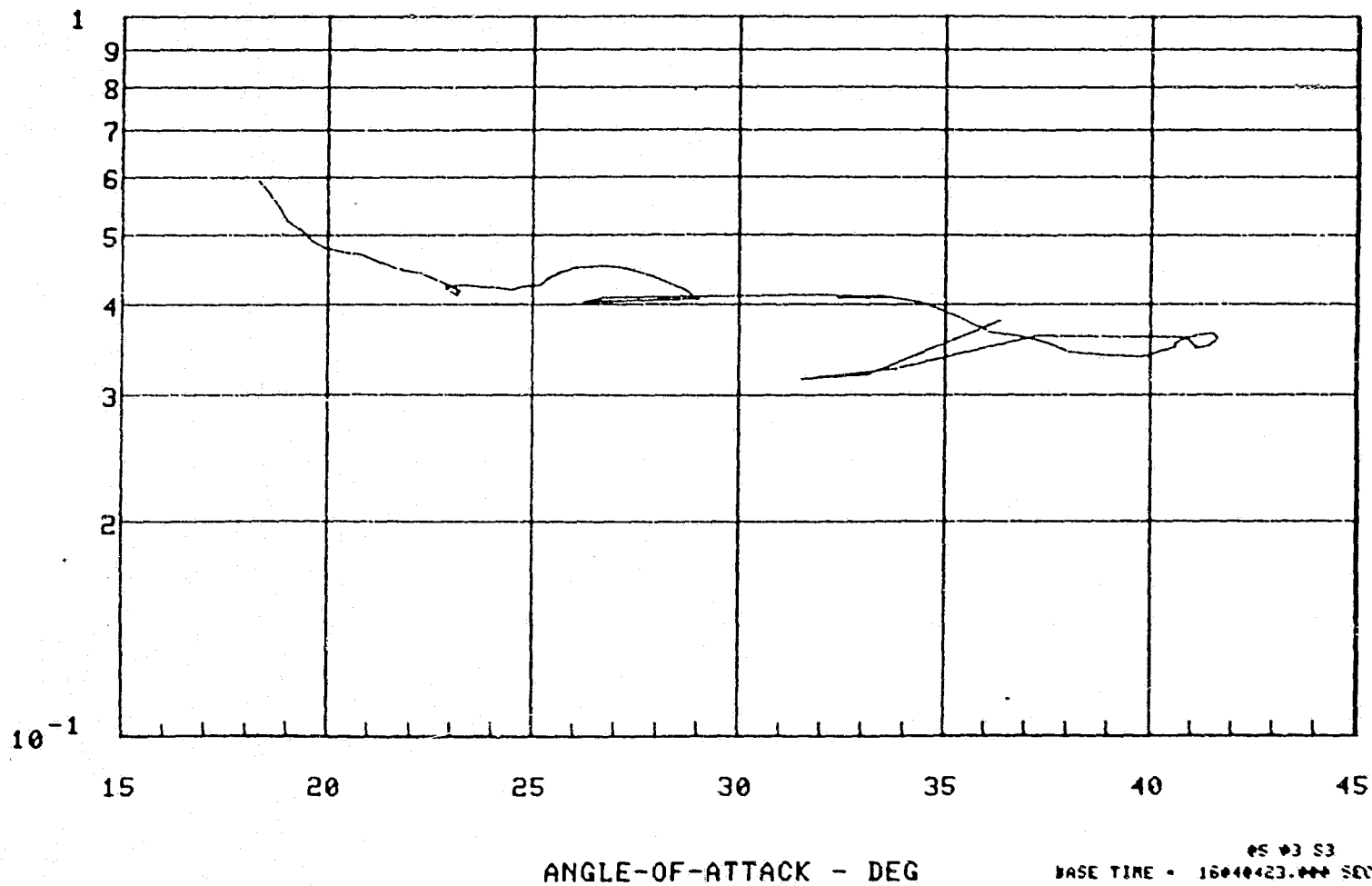
B-413

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U07T9714A/H-REF 965-1300 SEC

FILE CODE: H-H-REF

B-474



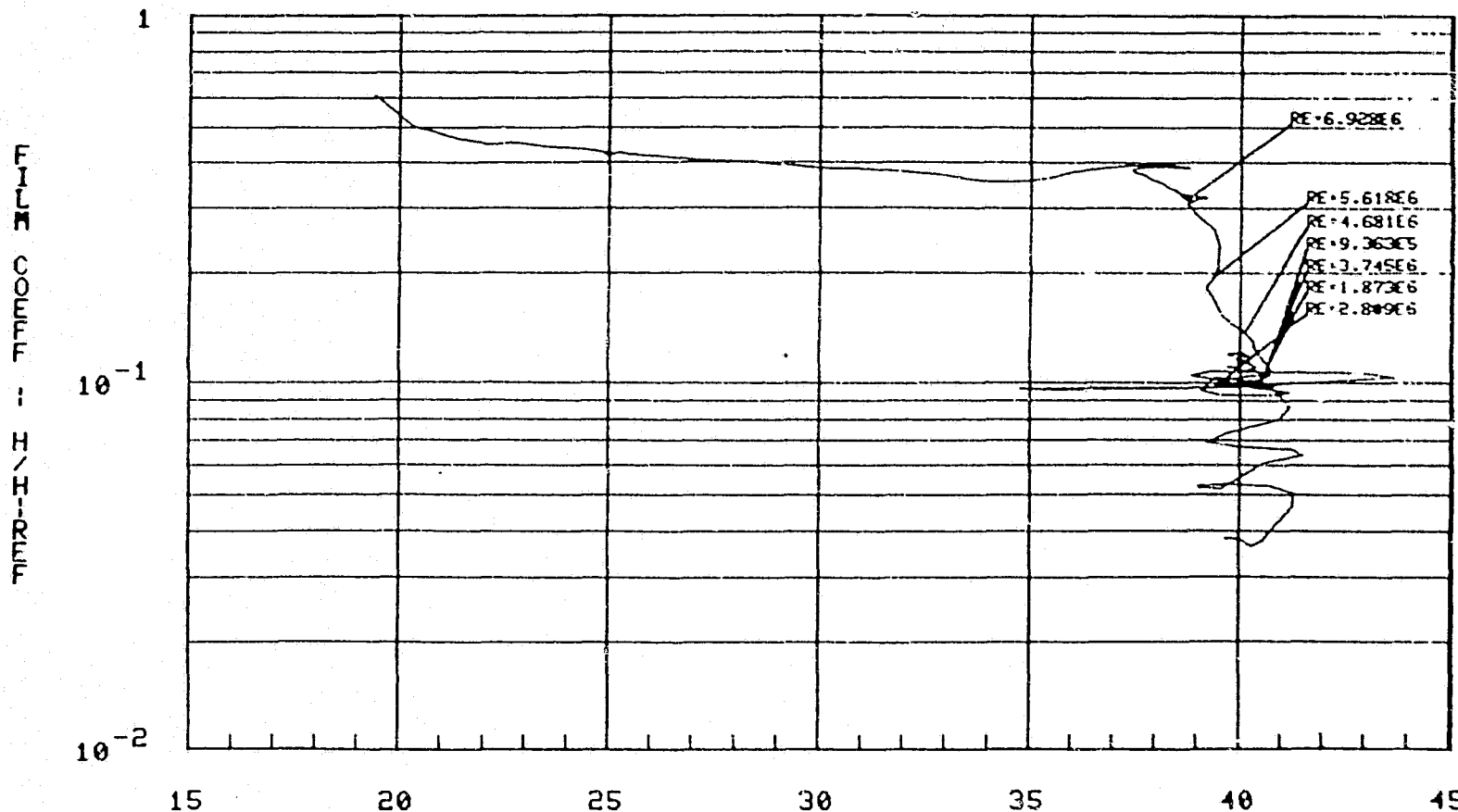
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PS 03 S3

BASE TIME - 16040423.000 SEC.

STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.98$

U07T9714A/H-REF 150-1350 SEC



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ANGLE-OF-ATTACK - DEG

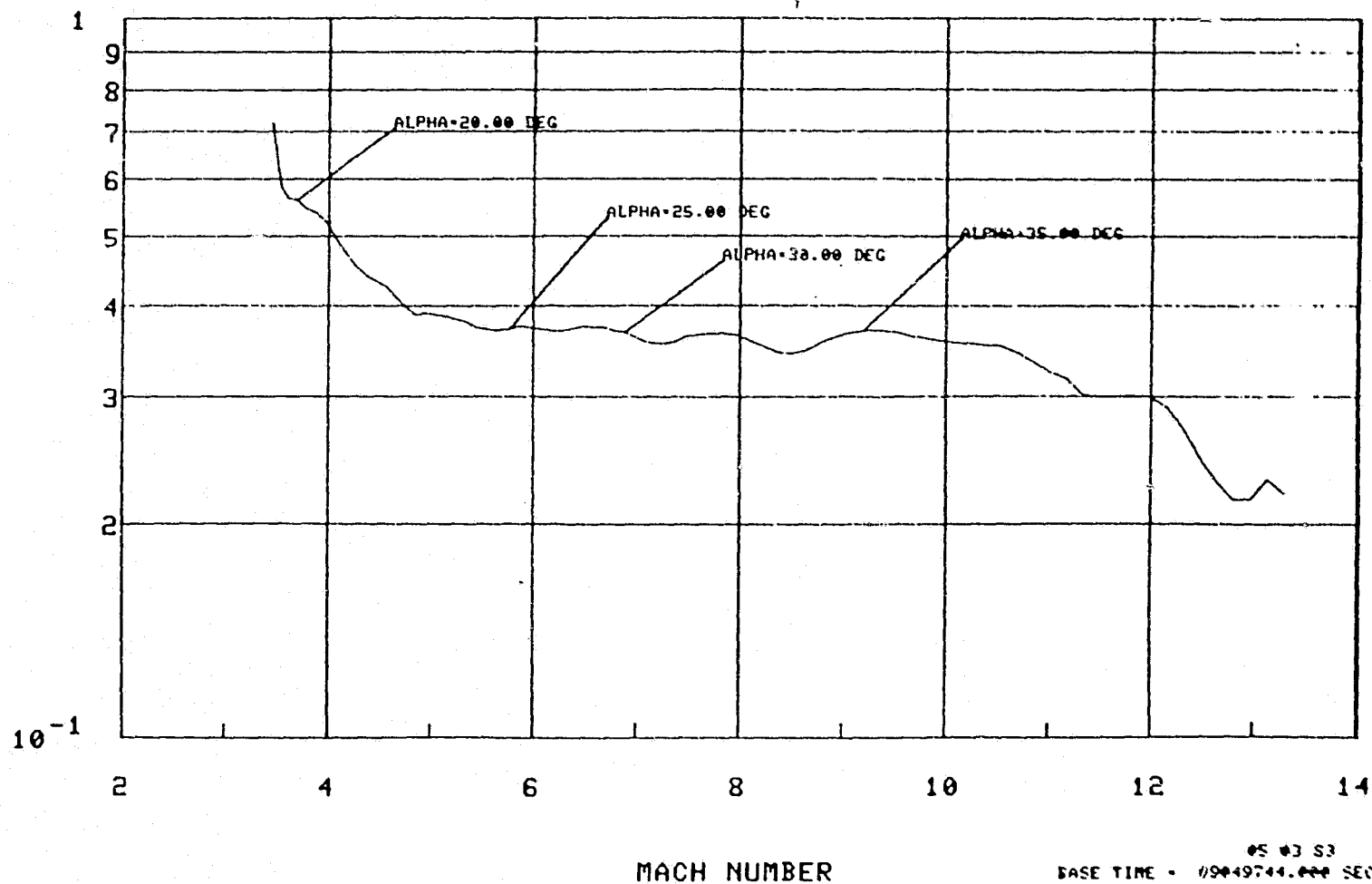
05 03 53
BASE TIME • 278.8591. ~~777~~ SEC.

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U07T9714A/H-REF 1065-1460 SEC

FILE CODE: H-H-RUL

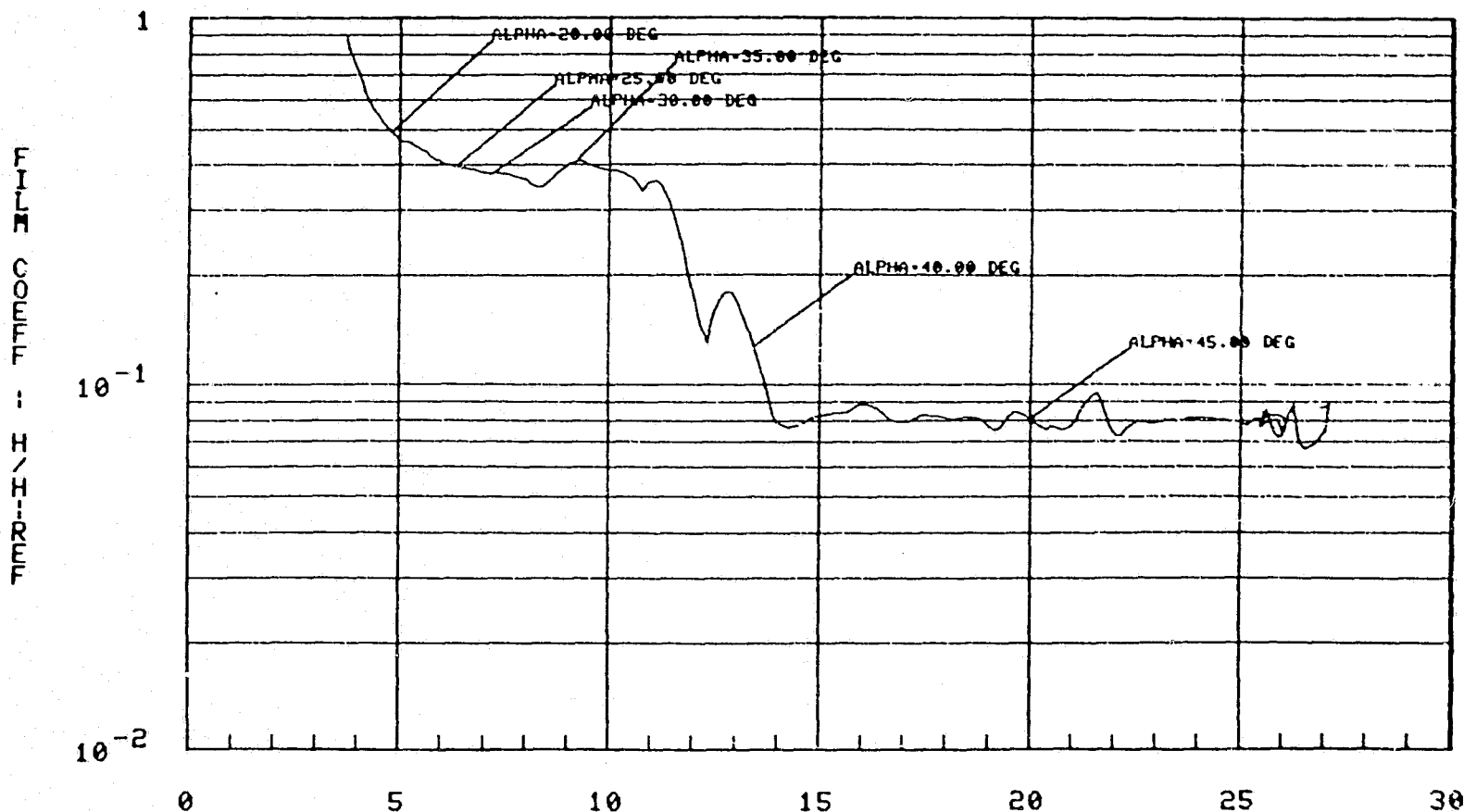
B-416



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STS-2 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U07T9714A/H-REF 200-1480 SEC



B-417

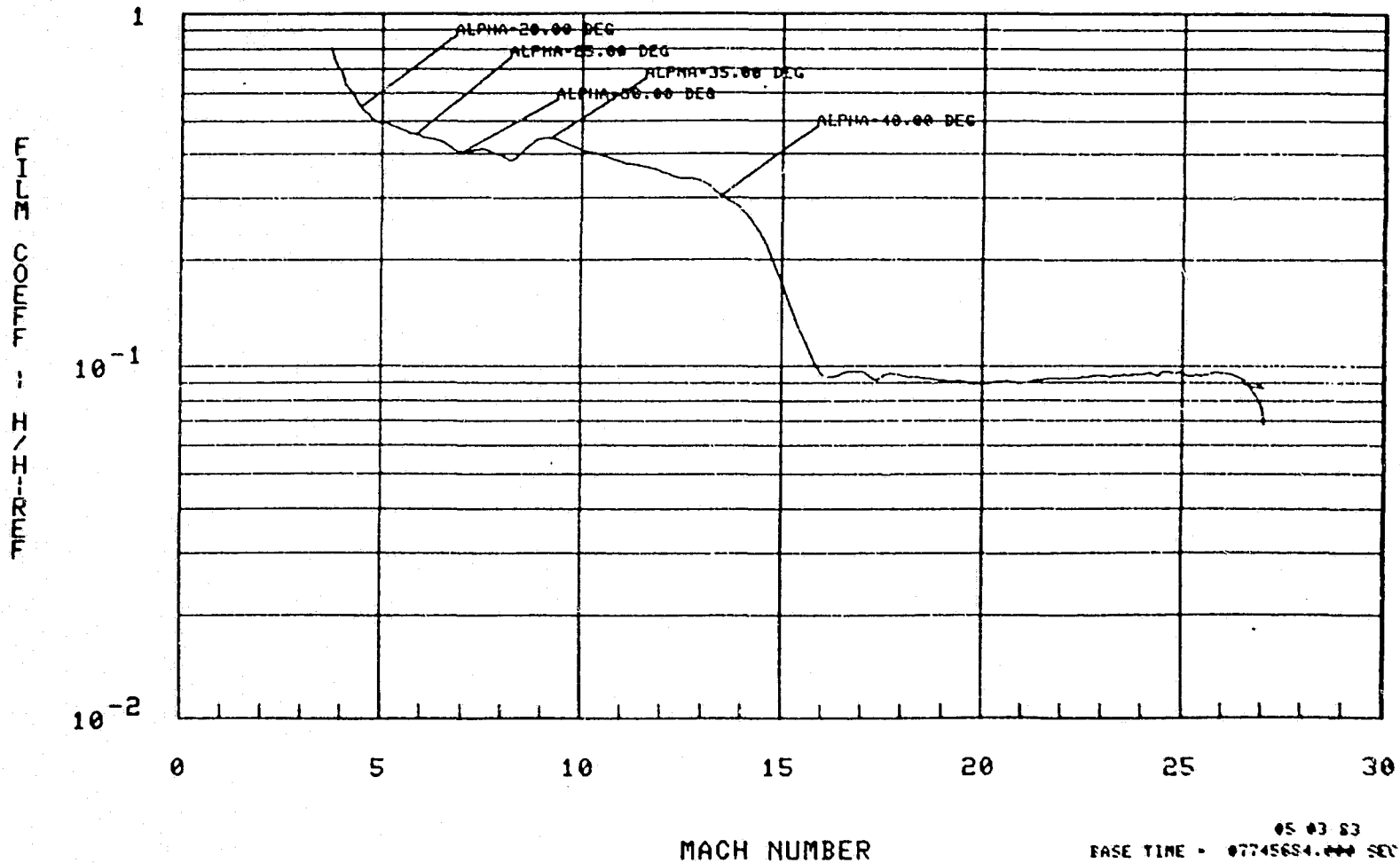
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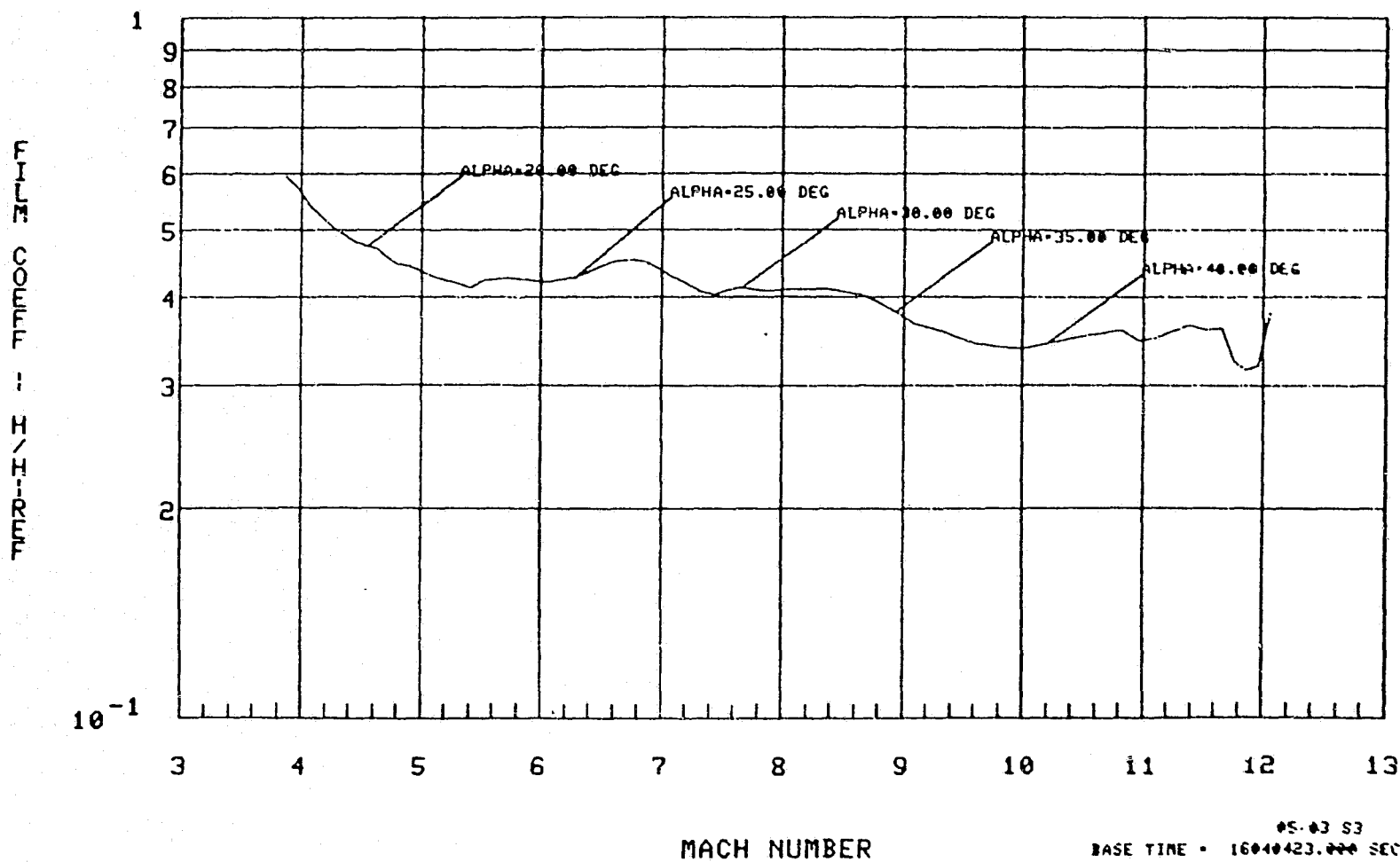


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B-418

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U07T9714A/H-REF 965-1300 SEC



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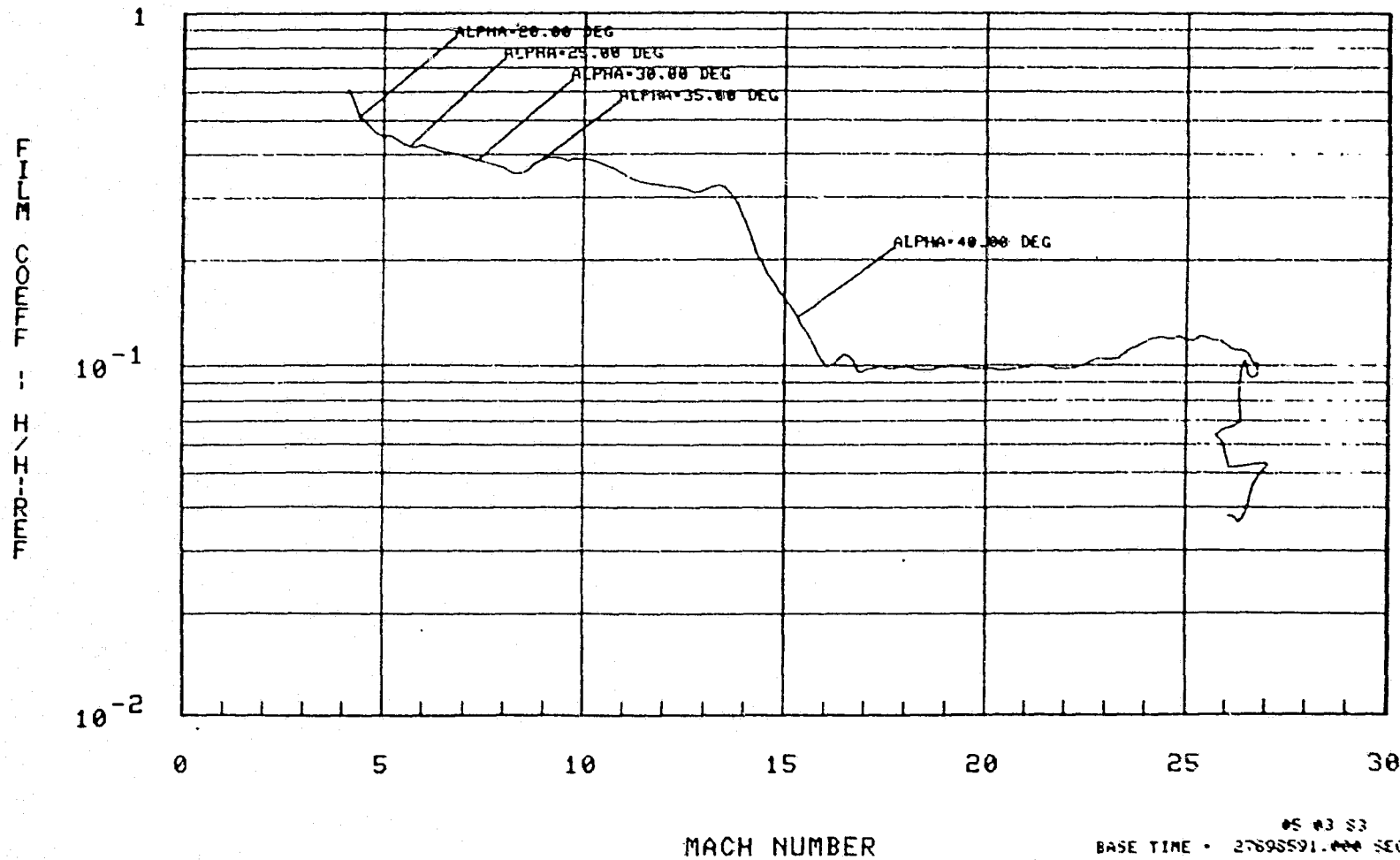
B-419

05-03 S3

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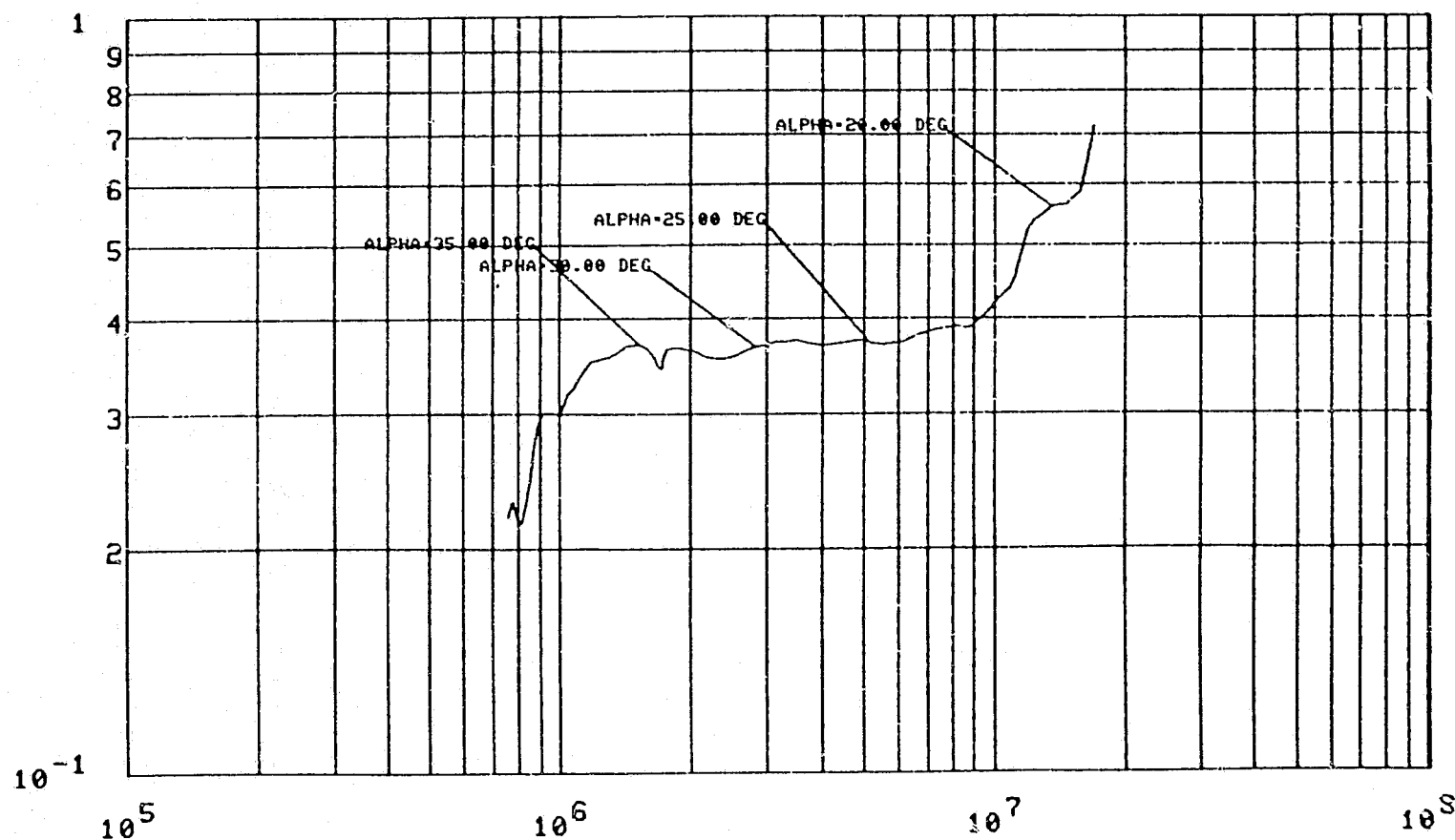


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B-420

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.98

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B-421

WING COEFFICIENT H/H-REF

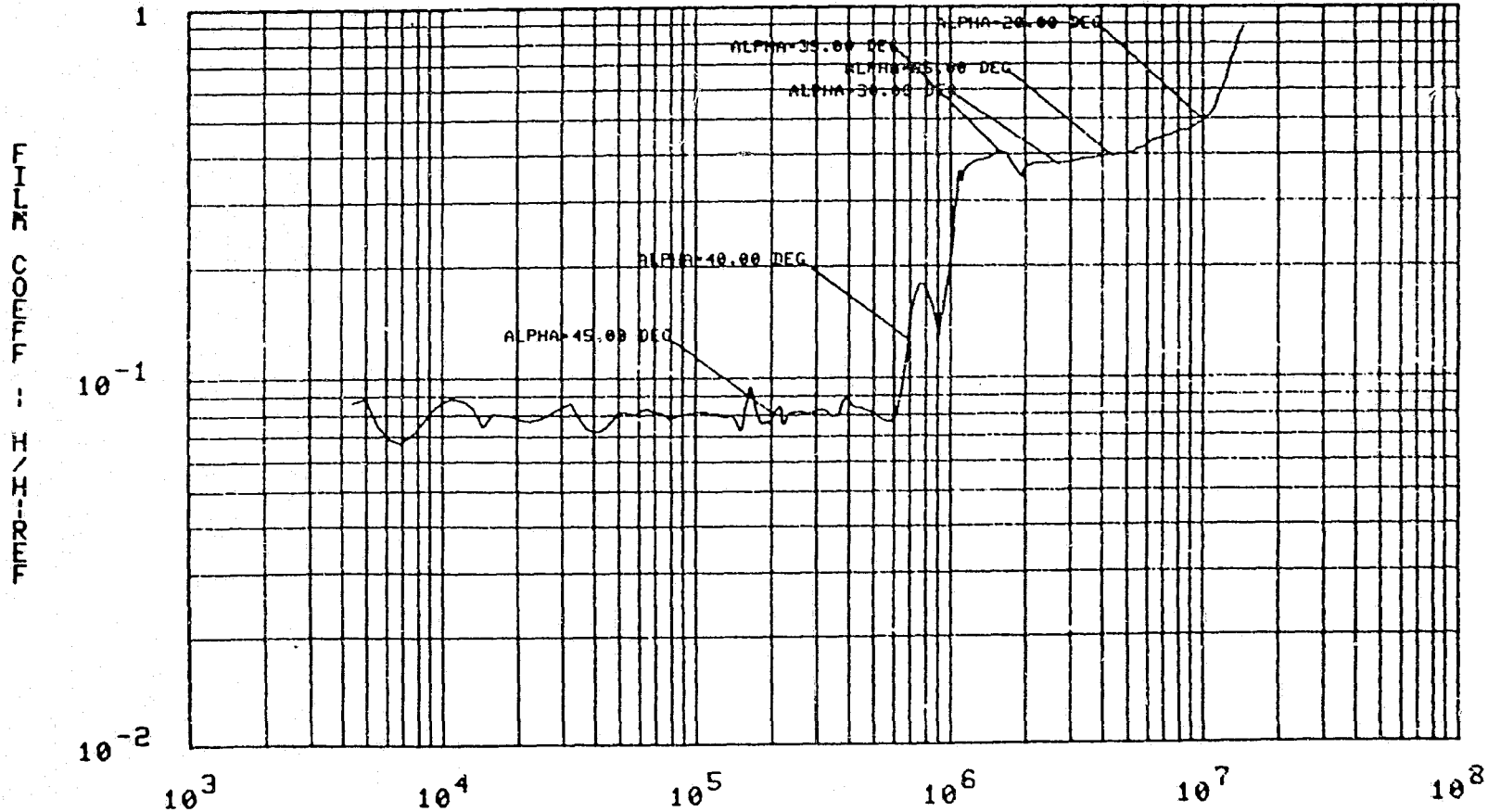
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REYNOLDS NUMBER (NS)

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U07T9714A/H-REF 200-1480 SEC



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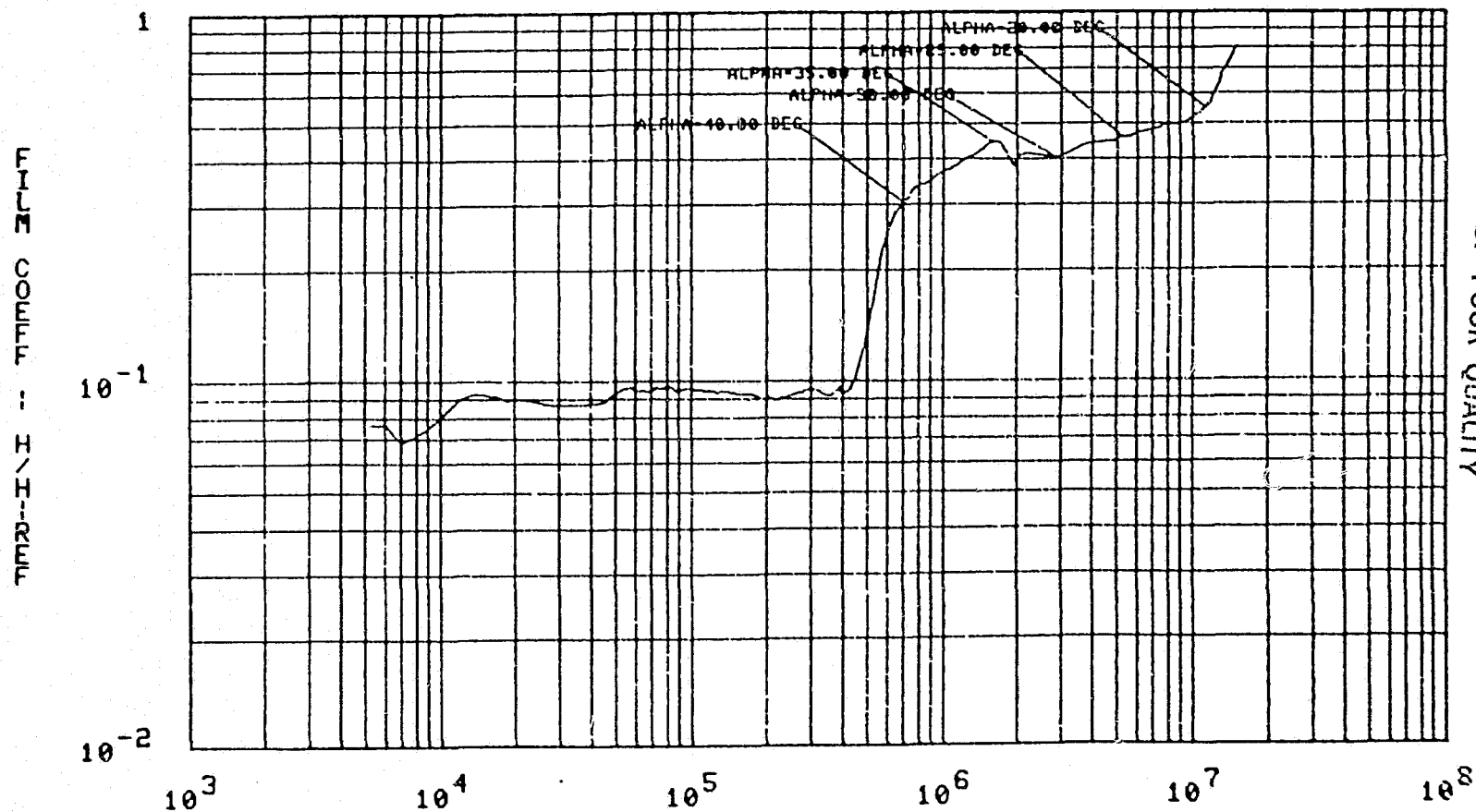
B-422

REYNOLDS NUMBER (NS)

05.03 S3
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STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.98$

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B-423

REYNOLDS NUMBER (NS)

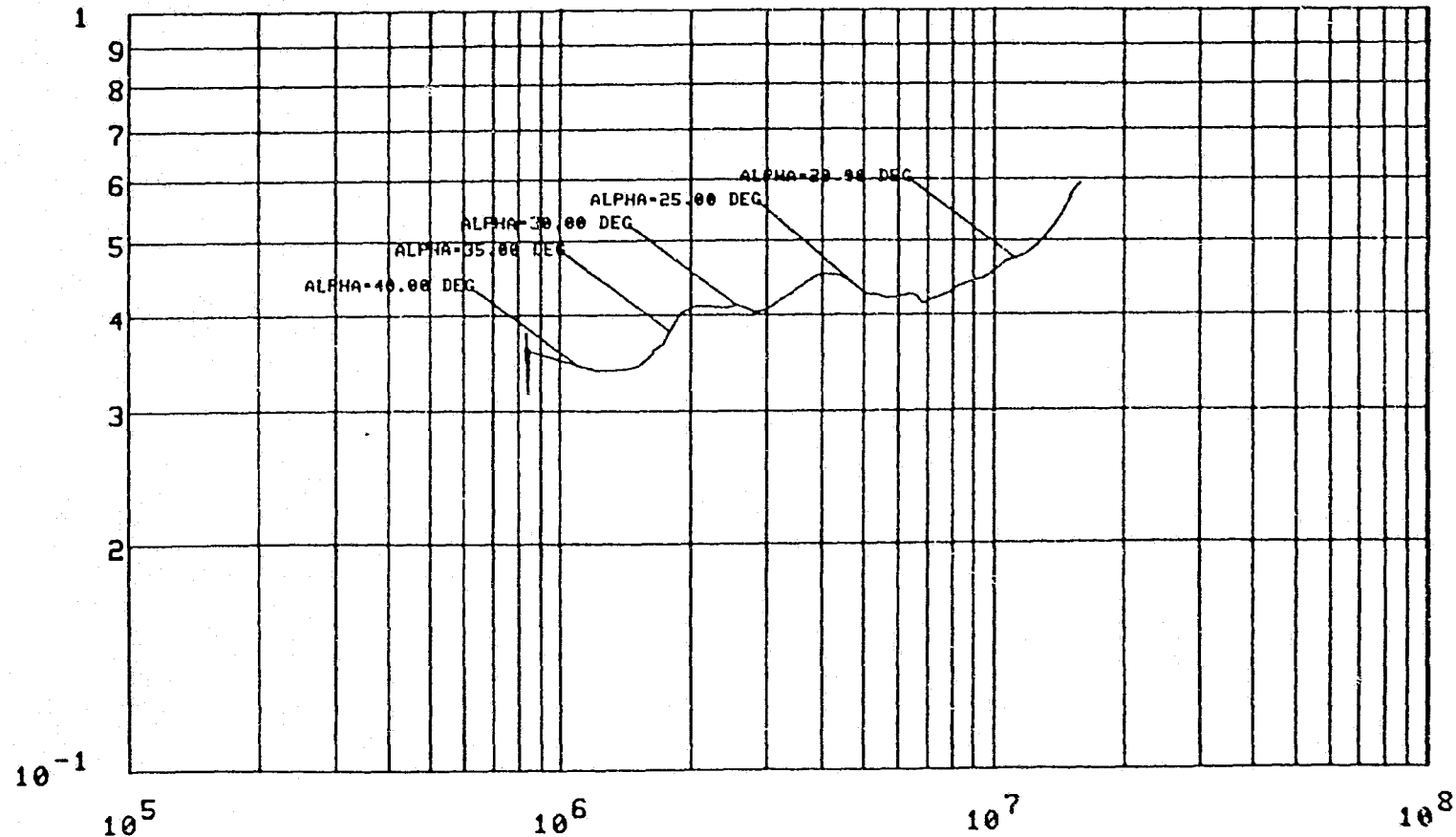
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U07T9714A/H-REF 965-1300 SEC

FILE COWELL - H/H-REF

B-424



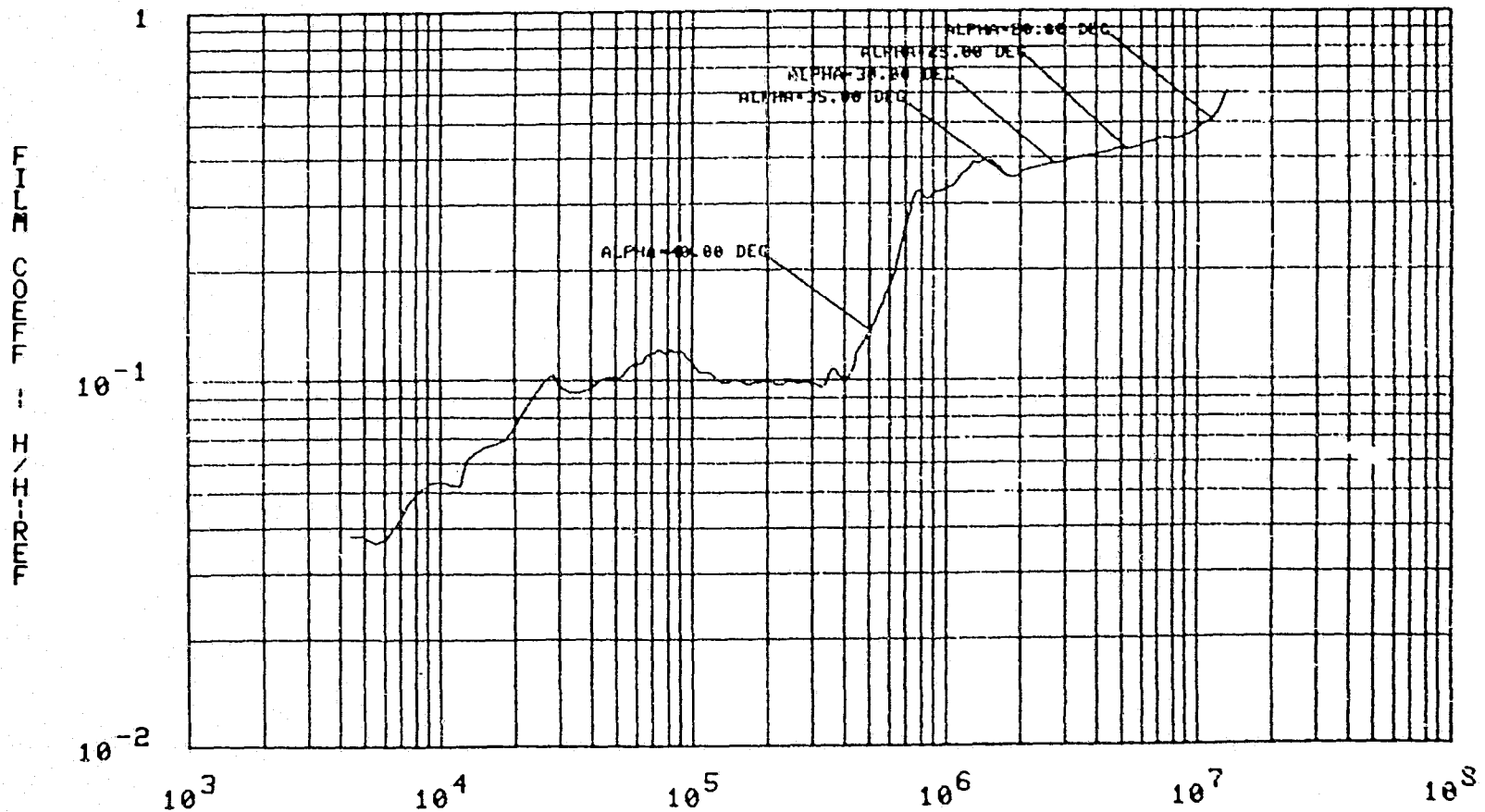
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REYNOLDS NUMBER (NS)

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STS-5 (107 FT LENGTH WING 80% SPAN) $X/C=0.98$

U07T9714A/H-REF 150-1350 SEC



REYNOLDS NUMBER (NS)

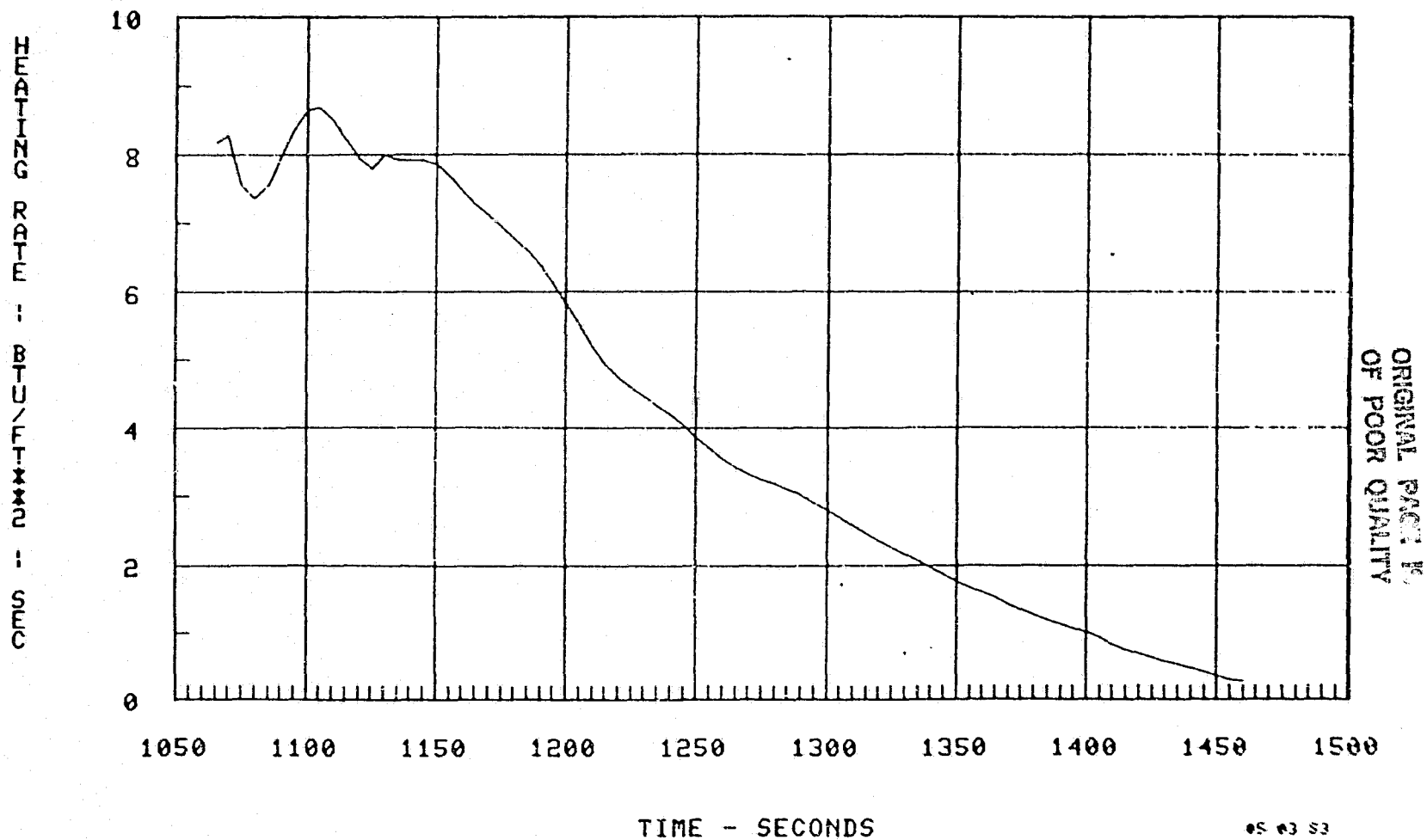
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B-425

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U87T9714A

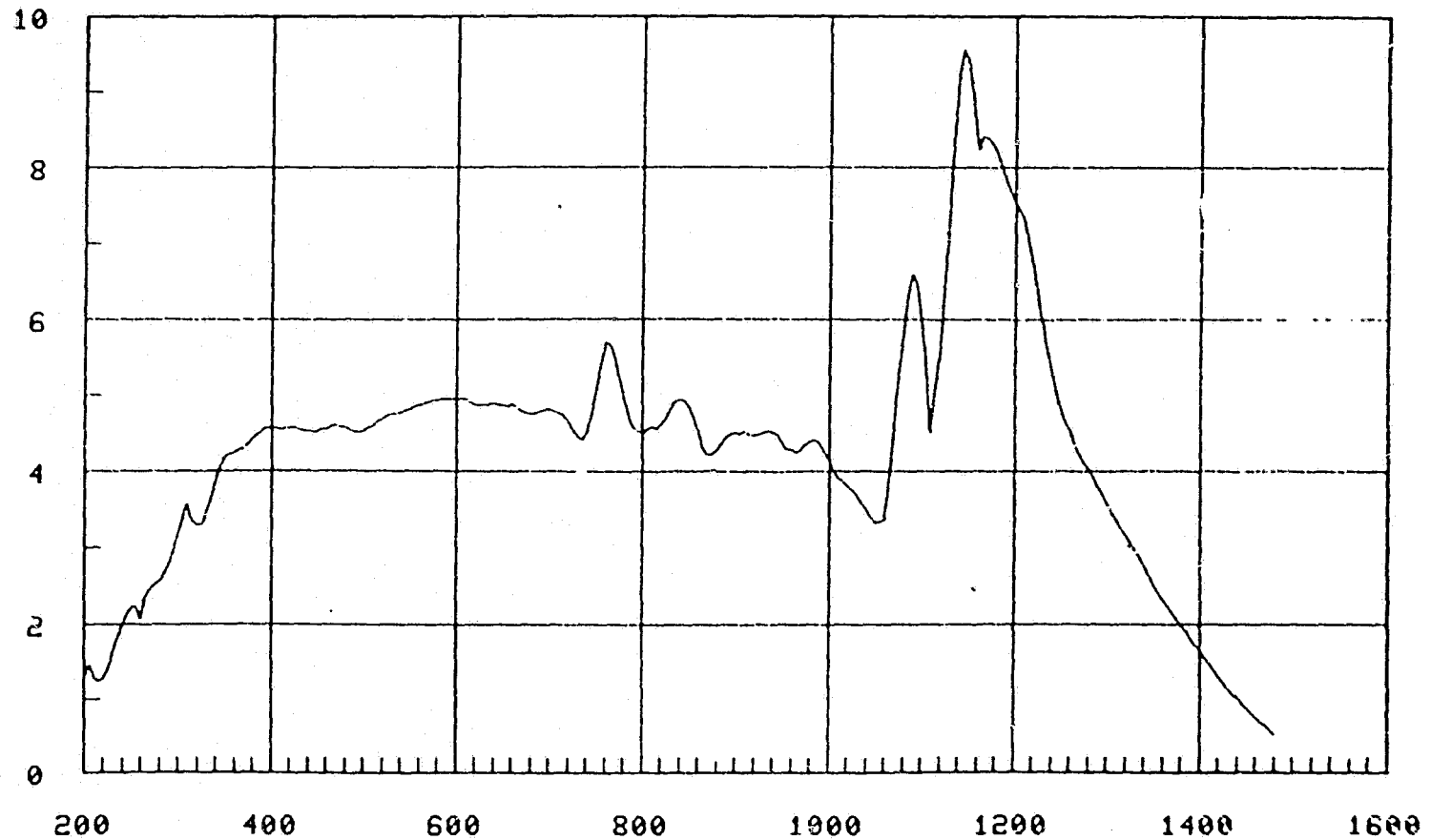


B-426

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U87T9714A

HEATING RATE : BTU/FT² : SEC



TIME - SECONDS

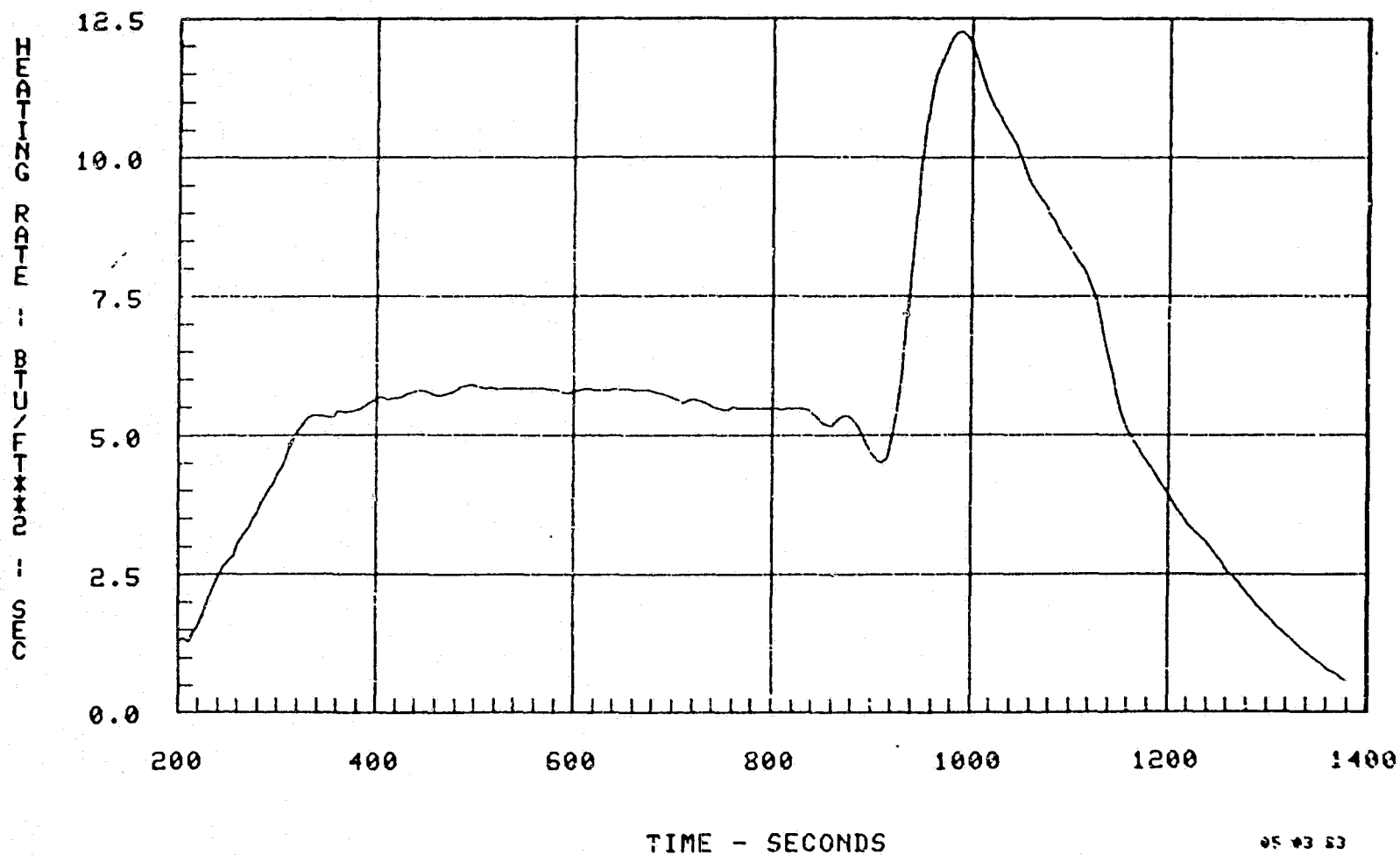
#5 #3 S3

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B-427

STS-3 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U87T9714A



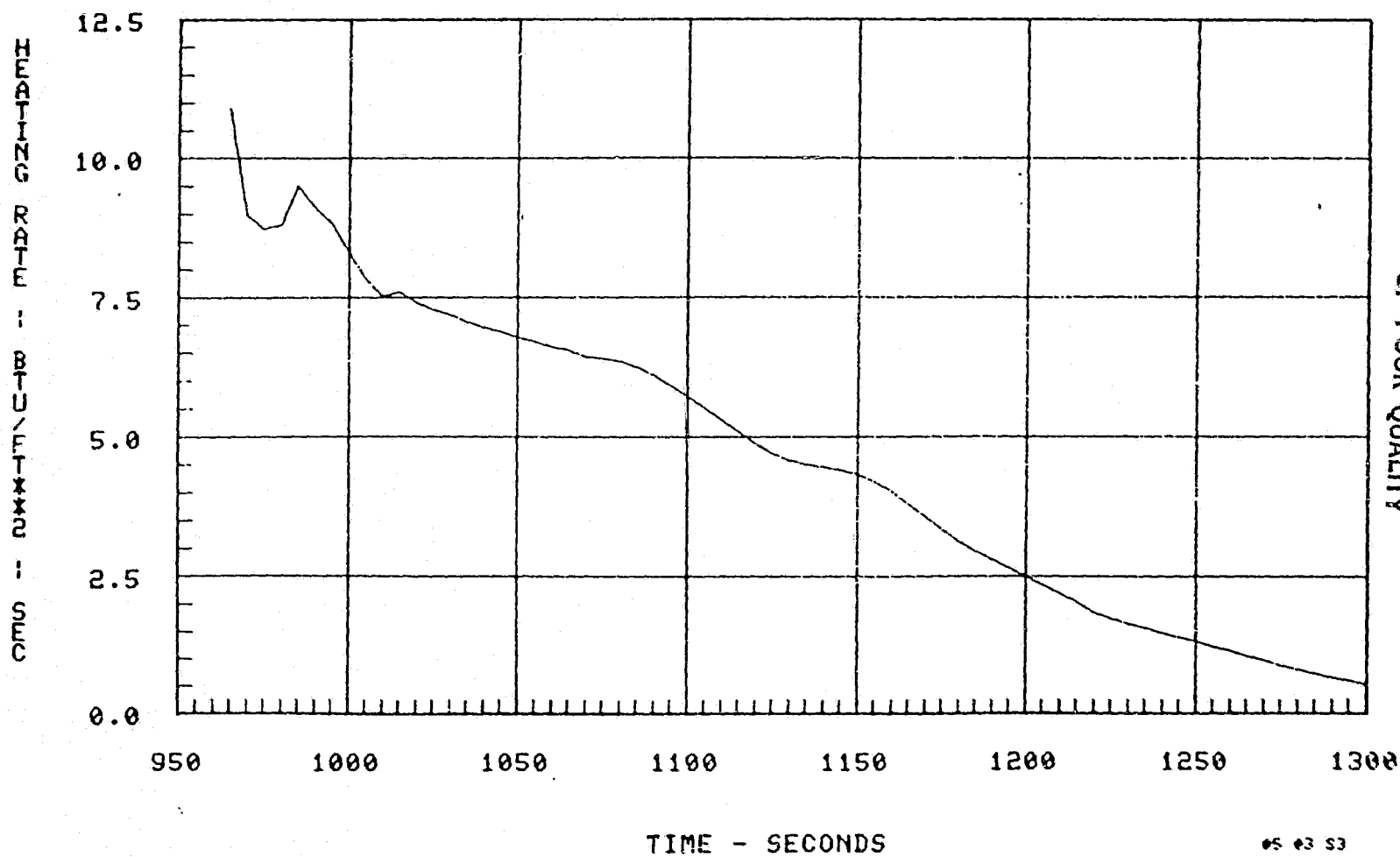
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05 43 53

B-428

STS-4 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U97T9714A

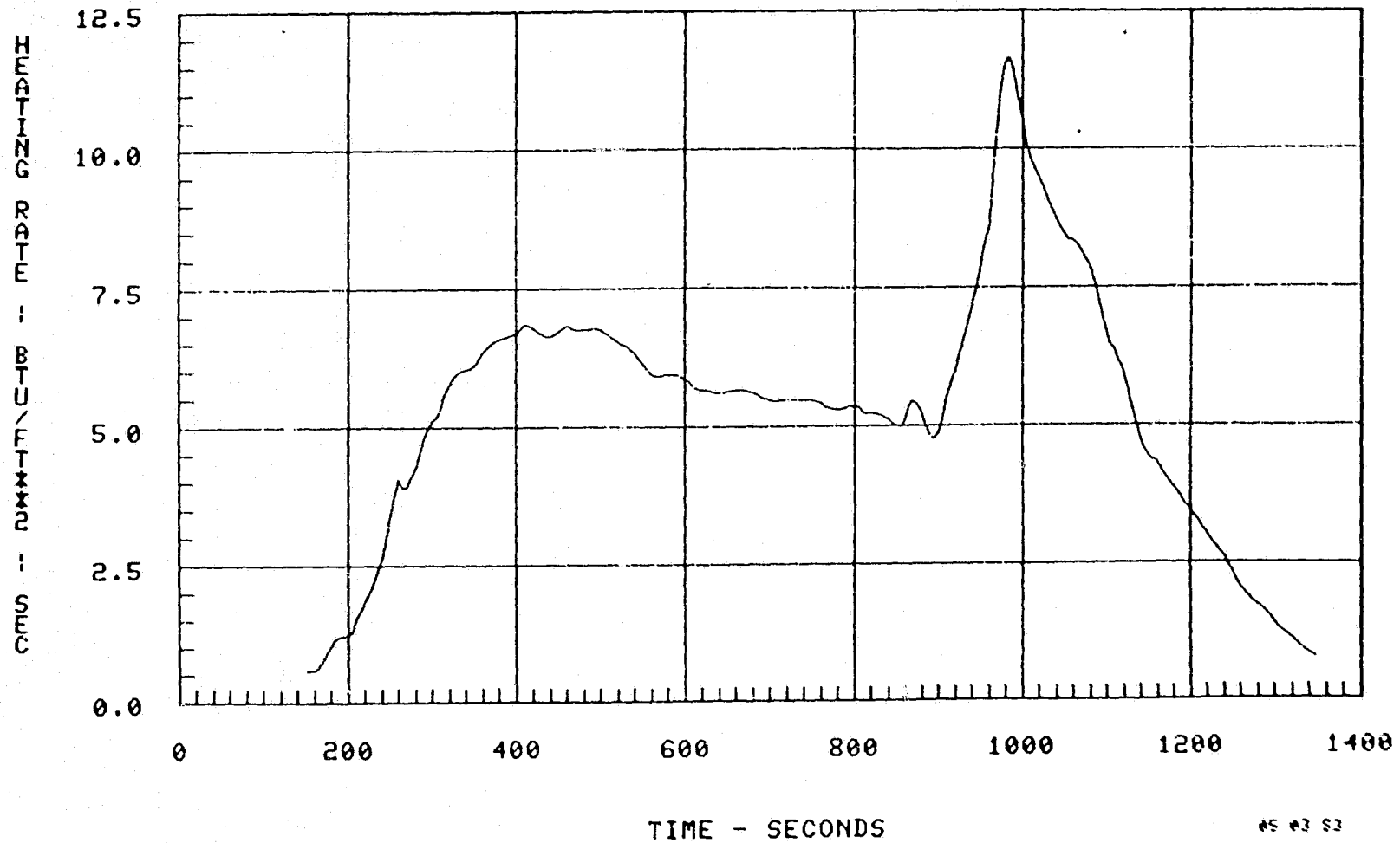


B-429

05 03 53

STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U07T9714A



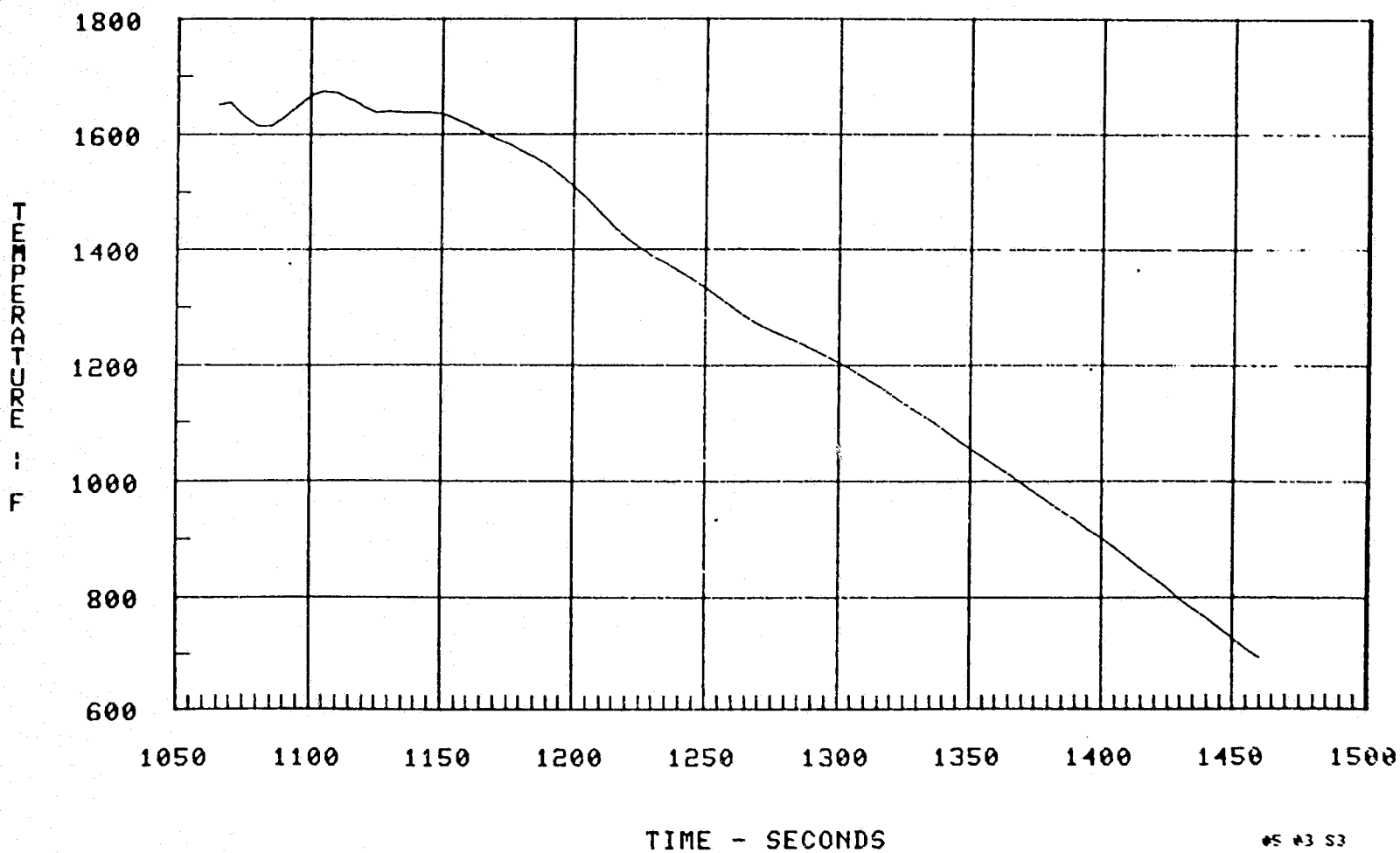
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B-430

45 43 53

STS-1 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U87T9714A



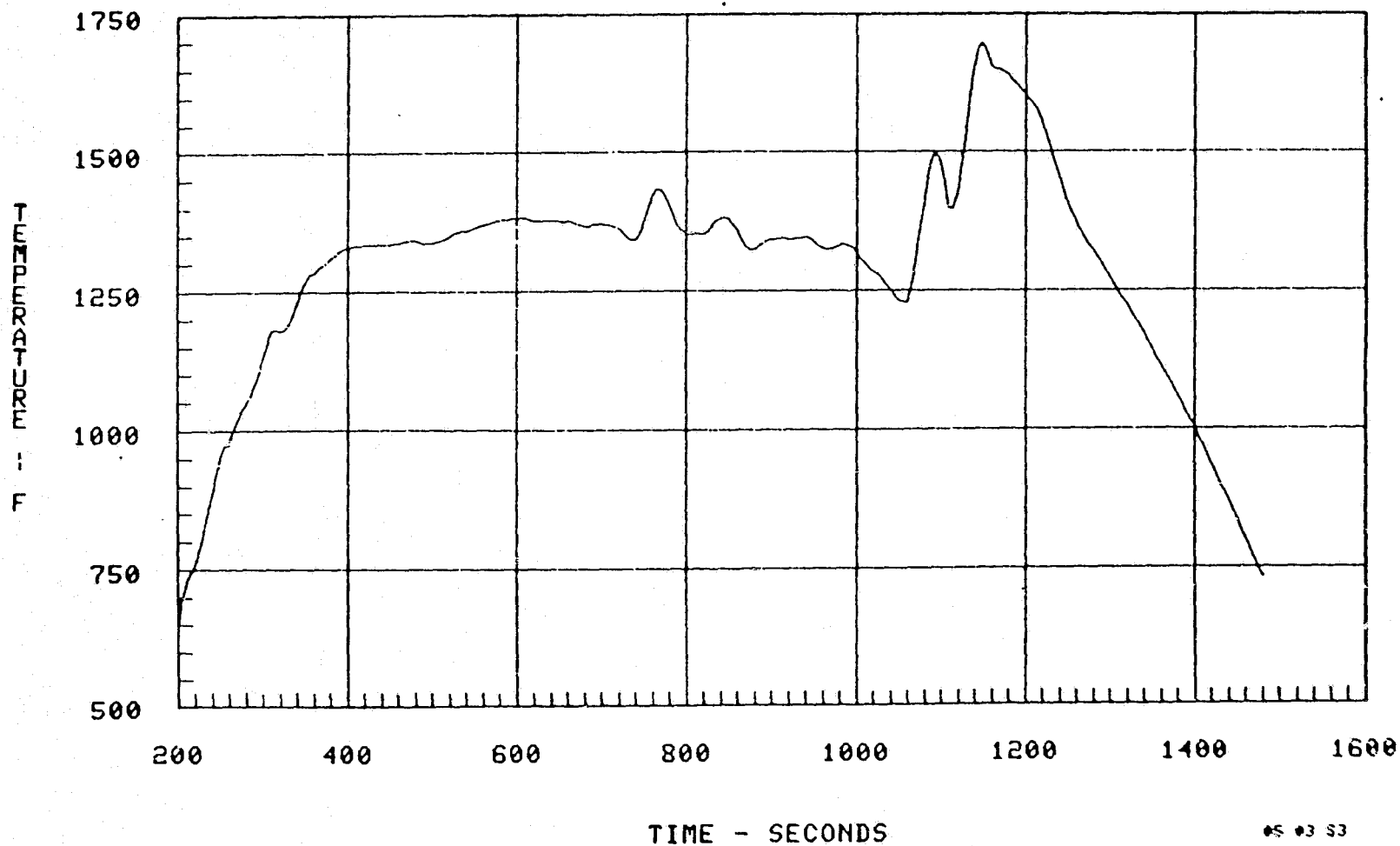
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B-431

05 03 S3

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U07T9714A



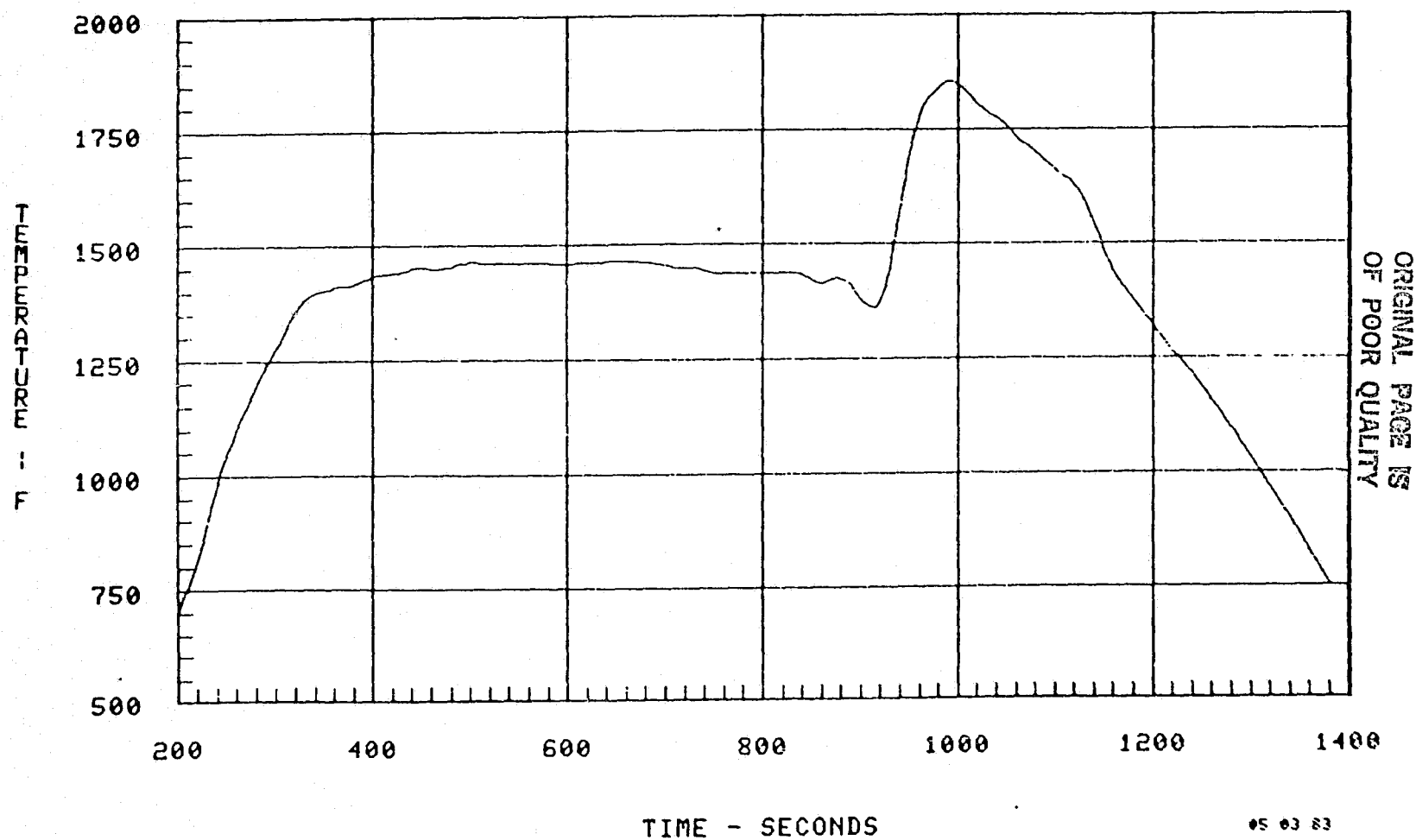
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B-432

3 53

STS-3 (107 FT LENGTH WING 80% SPAN) $X/C=0.98$

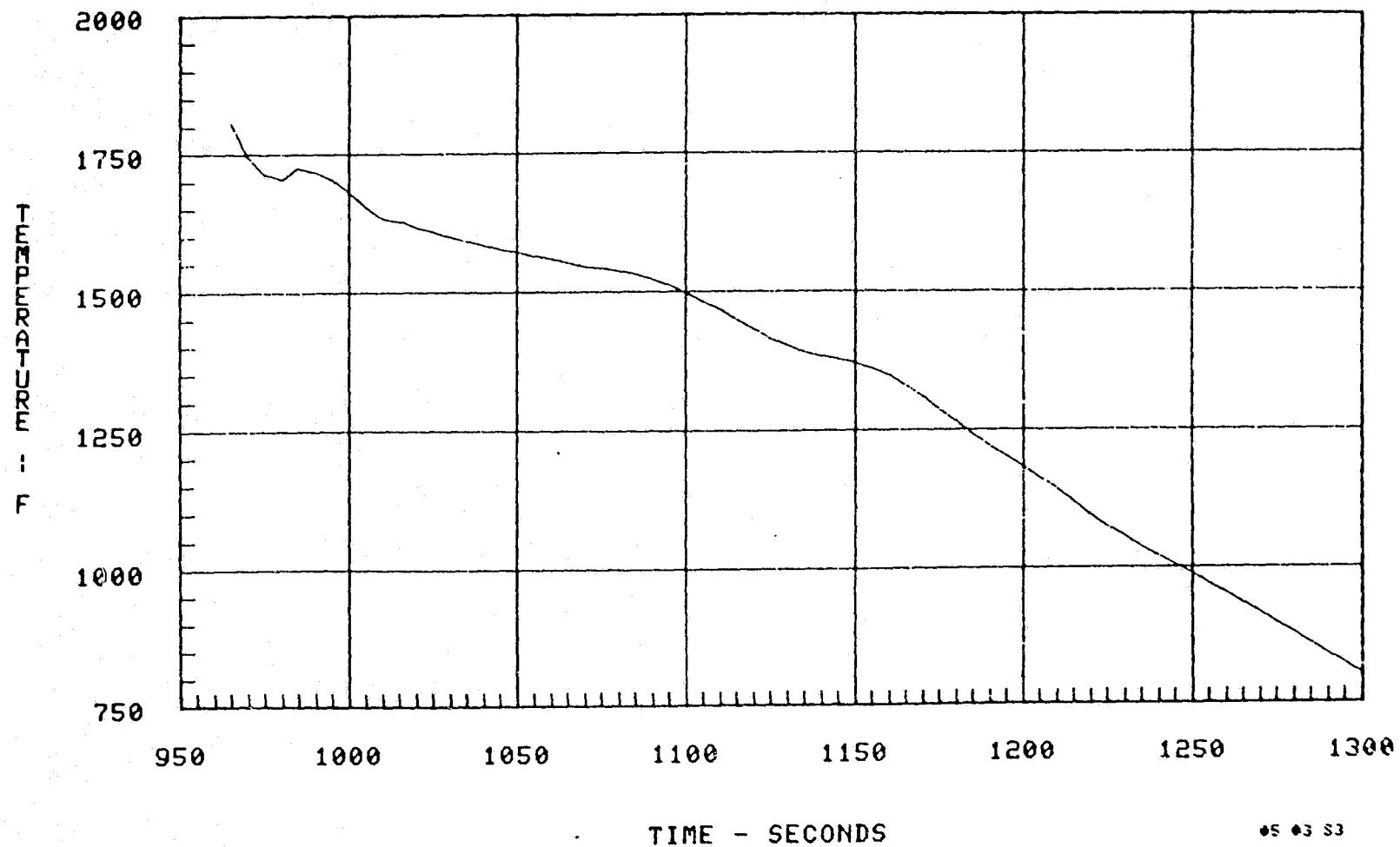
U07T9714A



B-433

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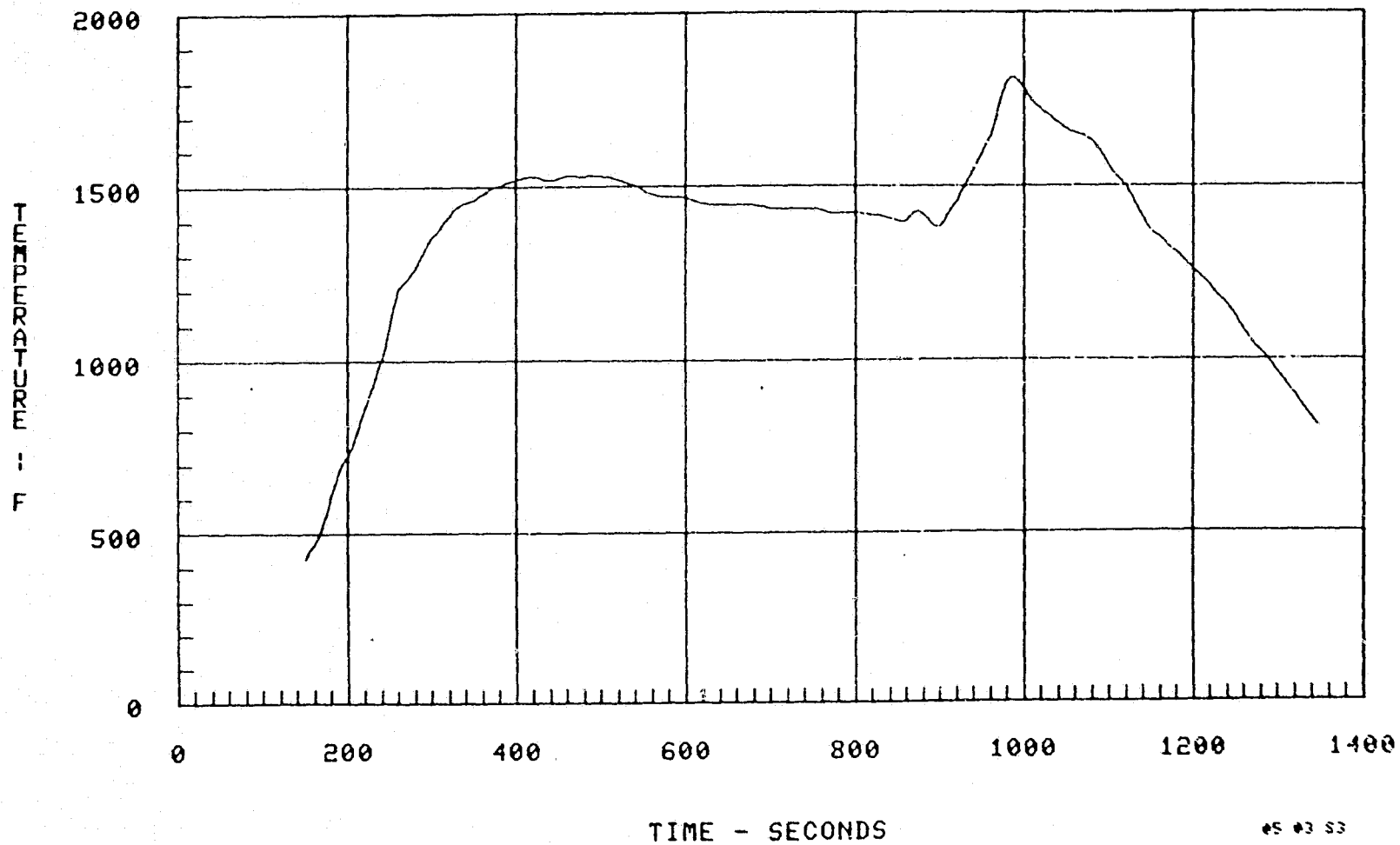


B-434

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STS-5 (107 FT LENGTH WING 80% SPAN) X/C=0.98

U07T9714A



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B-435

45 43 53